Lorna Puntillo <lpuntillo@kay-flo.com>
"Nelles, Clifford [USA]" <nelles_clifford@bah.com>
Gary Witkovski/R7/USEPA/US@EPA, Terry Robinson <trobinson@kay-flo.com>, Shawn Turner <sturner@kay-fl
03/17/2010 02:45 PM
Reply - CEI Documents

Good Afternoon Mr. Clifford:

Per our conversation attached you will see find the following:

YOUR E-MAIL QUESTIONS:

1. Hazardous Waste Manifests and LDR's from all of your Hazardous Waste Shipments dating from 3/11/2007--3/11/2010 - We have not had any shipment of hazardous waste during this time period. We used to reclaim our Parts Washer Fluid, under US EPA ID number - IAR000007310. We no longer perform this function and no longer have the parts washer.

2. Any analysis that you have on your Nulex Filter Cakes. any disposal information on the cakes. Please see the attached for the analysis of our filter cake. Each year we dispose of 169800 lbs to the Gill Landfill in Jackson, NE.

Please note the first filtration - are the insoluble materials that are washed and go into a holding tank. We then add all this material back into the process. The second filtration is the material, after processing, that is then sent to the landfill as non-hazardous / regular waste.

3. Invoices or Bills of Lading from your shipments of universal waste lamps, batteries, and used oil.

Lamps - We as a company have phased out using lamps that are mercury containing. Our previous and ongoing practice is to have our electricians bring the mercury containing lamps to a central location (address on the Bill of Lading), box up and have Safety Kleen dispose of for us. Our last disposal is as attached.

Batteries - We utilize an exchange program where when we purchase new from Sam's Club, they take the old to recycle.

Used Oil - All used oil is picked up by Jebro. Please see the attached Bill of Lading.

4. Invoice or Bill of Lading from any service of your Hi-Lo or Bobcat equipment. We do not have any Bill of Lading's for our Hi-Lo (Genie boom) or Bobcat equipment as these are purchased items and we perform maintenance on them in-house. All used oil is collected in-house and sent to Jebro.

CONVERSATION QUESTIONS:

1. Provide the Tier II report for the current reporting year.

2. Provide the MSDS's for materials listed on the Tier II report.

In closing, we have corrected the violation identified in your audit 3/11/10. The used oil container has been labeled with the words "USED OIL". Lastly, I will be submitting a formal response to Mr. Witkovski to address your findings and our corrective actions.

Thank you,

Lorna G. Puntillo
EHS Manager
216 Cunningham Drive
Sioux City, Iowa 51106
Office (712) 279-1947
Cell 1 (712) 204-9274
Cell 2 (712) 898-3393
Fax (866) 811-3870

"Nelles, Clifford [USA]" <nelles_clifford@bah.com>
"lpuntillo@kay-flo.com" <lpuntillo@kay-flo.com>, "trobinson@kay-flo.com" <trobinson@kay-flo.com>
"Nelles, Clifford [USA]" <nelles_clifford@bah.com>
03/15/2010 12:36 PM
CEI Documents

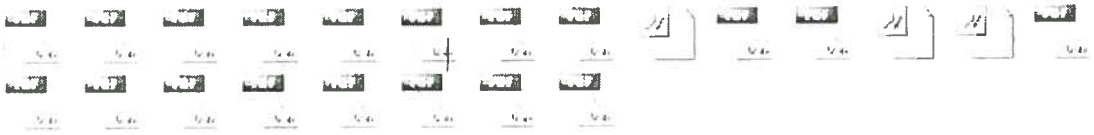
Lorna:
I will be needing copies of any of the following documents that you have:
1. Hazardous Waste Manifests and LDR's from all of your Hazardous Waste Shipments dating from 3/11/2007--3/11/2010
2. Any analysis that you have on your **Nulex Filter Cakes**. any disposal information on the cakes.
3. Invoices or Bills of Lading from your shipments of universal waste lamps, batteries, and used oil.
4. Invoice or Bill of Lading from any service of your Hi-Lo or Bobcat equipment.

You can either fax, email, or FedEx the material to me.
If you have any questions feel free to contact me.

Thank you

Cliff Nelles

ASE
2300 Main Suite 900
Kansas City, MO. 64108
Tel: 816-448-3254
Fax: 816-448-3850
nelles_clifford@bah.com



Nulex, Inc.
1919 Grand Avenue
Sioux City, Iowa 51106-5708

PHONE: 712-277-2011 • TOLL FREE: 800-831-4815 • FAX: 712-279-1946
WEBSITE: www.nulex.com

March 18, 2010

Gary R. Witkovski
Environmental Engineer
ENSV/EFCB
Federal Building
210 Walnut St., Room 473
Des Moines, IA 50309-2109

Subject: Response to Notice of Preliminary Findings for Nulex, EPA ID Number: IAR000007310.

Dear Mr. Witkovski:

On March 11, 2010, we had an inspection, performed by Mr. Cliff Nelles, with ASE. The inspection was held at Nulex, 2717 Port Neal Circle, Sergeant Bluff, IA 51054. The violation identified in the Notice of Preliminary Findings was as follows:

- Failure to label a used oil container with the words "Used Oil". 40 CFR 279.22(c).

Corrective actions were taken during the time of the inspection to label the used oil container with the words "Used Oil". As a go forward, we will continue to perform visual inspections on a regular basis to identify this discrepancy and correct upon identification.

Should you have any further questions, please feel free to call.

Sincerely,

Lorna G Puntillo
Nulex EHS Manager
216 Cunningham Dr.
Sioux City, Iowa 51106
O (712) 279-1947
F (866) 811-3870
C (712) 204-9274

Tier II Emergency and Hazardous Chemical Inventory

Reporting Period From January 1, 2009 to December 31, 2009

☑ Annual ☐ Revision

Facility Identification			
ID	1588		
Name	Nulex, Inc		
Street	2717 Port Neal Circle	City	Sergeant Bluff
County	Woodbury		
Fire Department	Sergeant Bluff Fire Department	LEPC Name	Woodbury County LEPC
State	IA	Zip	51054
Phone	712-279-1976	Lat/Long	42.381729/-96.358158
Fax		Email	lpuntillo@kay-flo.com

Owner/Operator Details	
Name	Dirk Lohry
Phone	712-379-1940
Street Address	1919 Grand Avenue
City	Sioux City
State	IA
Zip	51106
Country	United States

Mailing Address if different from Facility ID Address			
Company			
Attn			
Street Address 1	1919 Grand Avenue		
Street Address 2			
City	Sioux City	State	IA
Zip	51106	Phone	
Country	United States		

Emergency Contacts			
Name	Alan Den Ouden		
Title	Plant Manager		
Phone	712-279-1976	24 Hr.Phone	712-253-3159
Name	Terry Robinson		
Title	Manager		
Phone	712-279-1976	24 Hr.Phone	712-253-1562

NAICS	325311	Dun & Brad No	071035708
SIC Code	2873	TRIFID	
EIN ID(Tax Number)			

Mixture Components are listed in the Appendix.

Certification: I certify under penalty of law that I have personally examined and am familiar with the information submitted, and that based on my inquiry of those individuals responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Lorna G Puntillo, EHS Manager — Name and official title of owner/operator or authorized representative

2/23/2010 12:34 PM — Date

 — Signature

Optional Attachments

- ☐ Site Plan
- ☐ Site Coordinate Abbreviations
- ☐ Other Safeguard measures
- ☐ Emergency Response Plan

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 22948 Check if Chemical Information has changed from the last submission: ☑ CAS: 64197 Trade Secret: ☐ Chemical Name: ACETIC ACID EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☒ Pressure ☒ Reactivity ☒ Immediate ☒ Delayed ☐ (Chronic)	62117 Max Daily Amt(lbs) 04 Max Daily Amount Code 62117 Ave. Daily Amount (lbs.) 04 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: 212
Chemical ID: 22949 Check if Chemical Information has changed from the last submission: ☑ CAS: 7664417 Trade Secret: ☐ Chemical Name: AMMONIA, ANHYDROUS EHS: ☑ Contains EHS: ☐ EHS Name: AMMONIA ☑ Pure ☐ Mix ☐ Solid ☑ Liquid ☐ Gas	☑ Fire ☒ Pressure ☒ Reactivity ☐ Immediate ☐ Delayed ☐ (Chronic)	84362 Max Daily Amt(lbs) 04 Max Daily Amount Code 84362 Ave. Daily Amount (lbs.) 04 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 2; Temperature: 4; Storage Location: T301
Chemical ID: 22950 Check if Chemical Information has changed from the last submission: ☑ CAS: 12125029 Trade Secret: ☐ Chemical Name: AMMONIUM CHLORIDE EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☒ Immediate ☐ Delayed ☐ (Chronic)	560000 Max Daily Amt(lbs) 05 Max Daily Amount Code 560000 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: R; Pressure: 1; Temperature: 4; Storage Location: MORTON AND MAIN BLDG Container Type: J; Pressure: 1; Temperature: 4; Storage Location: MAIN
Chemical ID: 22951 Check if Chemical Information has changed from the last submission: ☑ CAS: 6484522 Trade Secret: ☐ Chemical Name: AMMONIUM NITRATE EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☒ Reactivity ☒ Immediate ☐ Delayed ☐ (Chronic)	392260 Max Daily Amt(lbs) 05 Max Daily Amount Code 392260 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T300 Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T90

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 22952 Check if Chemical Information has changed from the last submission: ☑ CAS: 7783202 Trade Secret: ☐ Chemical Name: AMMONIUM SULFATE EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	300362 Max Daily Amt(lbs) 05 Max Daily Amount Code 300362 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 5; Storage Location: T207
Chemical ID: 22953 Check if Chemical Information has changed from the last submission: ☐ CAS: 7783188 Trade Secret: ☐ Chemical Name: AMMONIUM THIOSULFATE EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☑ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	671046 Max Daily Amt(lbs) 05 Max Daily Amount Code 671046 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T20
Chemical ID: 27527 Check if Chemical Information has changed from the last submission: ☑ CAS: N/A Trade Secret: ☐ Chemical Name: APK EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	362576 Max Daily Amt(lbs) 05 Max Daily Amount Code 362576 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T-28 AND T-30
Chemical ID: 30204 Check If Chemical Information has changed from the last submission: ☑ CAS: 1336216 Trade Secret: ☐ Chemical Name: AQUA AMMONIA EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☑ Delayed (Chronic)	932355 Max Daily Amt(lbs) 05 Max Daily Amount Code 932355 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T210, T214, T26 Container Type: Q; Pressure: 1; Temperature: 4; Storage Location: T39001

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 22954 Check if Chemical Information has changed from the last submission: ☑ CAS: 77929 Trade Secret: ☐ Chemical Name: CITRIC ACID EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	76000 Max Daily Amt(lbs) 04 Max Daily Amount Code 76000 Ave. Daily Amount (lbs.) 04 Ave. Daily Amount Code 365 No of days in site	Container Type: J; Pressure: 1; Temperature: 4; Storage Location: MORTON BLDG
Chemical ID: 22955 Check if Chemical Information has changed from the last submission: ☑ CAS: 68055549 Trade Secret: ☐ Chemical Name: DIATOMACEOUS EARTH EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☐ Immediate ☑ Delayed (Chronic)	100000 Max Daily Amt(lbs) 05 Max Daily Amount Code 100000 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: R; Pressure: 1; Temperature: 4; Storage Location: FILTER AND GRAND PLANT
Chemical ID: 22956 Check if Chemical Information has changed from the last submission: ☑ CAS: 60004 Trade Secret: ☐ Chemical Name: EDTA EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	82000 Max Daily Amt(lbs) 04 Max Daily Amount Code 82000 Ave. Daily Amount (lbs.) 04 Ave. Daily Amount Code 365 No of days in site	Container Type: J; Pressure: 1; Temperature: 4; Storage Location: MORTON BLDG
Chemical ID: 22957 Check if Chemical Information has changed from the last submission: ☑ CAS: N/A Trade Secret: ☑ Chemical Name: FERTILIZER (VARIOUS BLENDS) EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	17423357 Max Daily Amt(lbs) 07 Max Daily Amount Code 17423357 Ave. Daily Amount (lbs.) 07 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T3, T5, T6, T8, T10 AND T18 Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T19, T20, T29 AND T50 Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T51, T62, T63 AND T64

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 9017 Check if Chemical Information has changed from the last submission: ☑ CAS: N/A Trade Secret: ☑ Chemical Name: NULEX FERTILIZERS (VARIOUS BLENDS) EHS: ☐ Contains EHS: ☐ EHS Name ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	17576183 Max Daily Amt(lbs) 07 Max Daily Amount Code 17576183 Ave. Daily Amount (lbs.) 07 Ave. Daily Amount Code 365 No of days in site	Container Type / Pressure / Temperature / Storage Location A / 1 / 4 / T01, T02, T4, T7, T16, T17 A / 1 / 4 / T19000, T19003, T19004 A / 1 / 4 / T19007, T22, T24, T25 A / 1 / 4 / T27, T11 AND T61
Chemical ID: 22959 Check if Chemical Information has changed from the last submission: ☑ CAS: 7664382 Trade Secret: ☐ Chemical Name: PHOSPHORIC ACID EHS: ☐ Contains EHS: ☐ EHS Name ☑ Pure ☐ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	2234521 Max Daily Amt(lbs) 06 Max Daily Amount Code 2234521 Ave. Daily Amount (lbs.) 06 Ave. Daily Amount Code 365 No of days in site	Container Type / Pressure / Temperature / Storage Location A / 1 / 4 / SS316, T204, T720 Q / 1 / 4 / RAILCAR A / 1 / 4 / T722, T726, T727, A / 1 / 4 / T728 AND T7924
Chemical ID: 22960 Check if Chemical Information has changed from the last submission: ☑ CAS: 1310583 Trade Secret: ☐ Chemical Name: POTASSIUM HYDROXIDE, (LIQUID) EHS: ☐ Contains EHS: ☐ EHS Name ☑ Pure ☐ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	761504 Max Daily Amt(lbs) 05 Max Daily Amount Code 761504 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type / Pressure / Temperature / Storage Location A / 1 / 4 / T724 & T725 Q / 1 / 4 / RAILCAR
Chemical ID: 22961 Check if Chemical Information has changed from the last submission: ☑ CAS: N/A Trade Secret: ☑ Chemical Name: ROOT GROWTH STIMULATOR EHS: ☐ Contains EHS: ☐ EHS Name ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	217550 Max Daily Amt(lbs) 05 Max Daily Amount Code 217550 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type / Pressure / Temperature / Storage Location M / 1 / 4 / MORTON BLDG A / 1 / 4 / T19006 O / 1 / 4 / MORTON BLDG

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 22962 Check if Chemical Information has changed from the last submission: ☑ CAS: 497198 Trade Secret: ☐ Chemical Name: SODIUM CARBONATE EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	14000 Max Daily Amt(lbs) 04 Max Daily Amount Code 14000 Ave. Daily Amount (lbs.) 04 Ave. Daily Amount Code 365 No of days in site	Container Type: J; Pressure: 1; Temperature: 4; Storage Location: MORTON BLDG
Chemical ID: 30205 Check if Chemical Information has changed from the last submission: ☑ CAS: 16721805 Trade Secret: ☐ Chemical Name: SODIUM HYDROSULFIDE EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☑ Delayed (Chronic)	105178 Max Daily Amt(lbs) 05 Max Daily Amount Code 105178 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T960
Chemical ID: 22963 Check if Chemical Information has changed from the last submission: ☑ CAS: 1310732 Trade Secret: ☐ Chemical Name: SODIUM HYDROXIDE EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☑ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	916385 Max Daily Amt(lbs) 05 Max Daily Amount Code 916385 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: A; Pressure: 1; Temperature: 4; Storage Location: T721 AND T723
Chemical ID: 22964 Check if Chemical Information has changed from the last submission: ☑ CAS: 7558807 Trade Secret: ☐ Chemical Name: SODIUM PHOSPHATE FEED SUPPLEMENT EHS: ☐ Contains EHS: ☐ EHS Name: ☐ Pure ☑ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☐ Reactivity ☑ Immediate ☐ Delayed (Chronic)	934700 Max Daily Amt(lbs) 05 Max Daily Amount Code 934700 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: R; Pressure: 1; Temperature: 4; Storage Location: 72, 73, 701, 702, 703, ~~704~~ Container Type: J; Pressure: 1; Temperature: 4; Storage Location: MORTON BLDG Container Type: R; Pressure: 1; Temperature: 4; Storage Location: T710, T711, AND T712

Chemical Description	Physical & Health Hazards	Inventory	Storage Codes & Location
Chemical ID: 22965 Check if Chemical Information has changed from the last submission: ☑ CAS: 7664939 Trade Secret: ☐ Chemical Name: SULPHURIC ACID EHS: ☑ Contains EHS: ☐ EHS Name: SULFURIC ACID ☐ Pure ☑ Mix ☐ Solid ☑ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☑ Delayed (Chronic)	1174620 Max Daily Amt(lbs) 06 Max Daily Amount Code 1174620 Ave. Daily Amount (lbs.) 06 Ave. Daily Amount Code 365 No of days in site	Container Type: Q; Pressure: 1; Temperature: 4; Storage Location: RAILCAR Container Type: A; Pressure: 2; Temperature: 4; Storage Location: T201 AND T205
Chemical ID: 30206 Check if Chemical Information has changed from the last submission: ☑ CAS: 7646857 Trade Secret: ☐ Chemical Name: ZINC CHLORIDE EHS: ☐ Contains EHS: ☐ EHS Name: ☑ Pure ☐ Mix ☑ Solid ☐ Liquid ☐ Gas	☐ Fire ☐ Pressure ☑ Reactivity ☑ Immediate ☐ Delayed (Chronic)	561042 Max Daily Amt(lbs) 05 Max Daily Amount Code 561042 Ave. Daily Amount (lbs.) 05 Ave. Daily Amount Code 365 No of days in site	Container Type: J; Pressure: 1; Temperature: 4; Storage Location: T202 AND T203

Tier II Emergency and Hazardous Chemical Inventory Appendix
MIXTURE COMPONENT FORM

Name of Substance: NULEX FERTILIZERS (VARIOUS BLENDS) CAS: N/A Chemical ID: 9017

Chemical Name	%	CAS #	EHS	EHS Name
Ammonium Hydroxide		1336-2-1--6	☐	
Zinc Amine		7440-6-6--6	☐	
Zinc Ammonium Chloride		14639-9-8--6	☐	
Zinc Sulfate		7733-0-2--0	☐	
Zinc Chloride		1336-2-1--6	☐	
Lead (Trace Amounts)		7439-9-2--1	☐	
Water			☐	

Valid 05/2003 - 07/2003

Aldrich Chemical Co., Inc.
1001 West St. Paul
Milwaukee, WI 53233 USA
Phone: 414-273-3850

M A T E R I A L S A F E T Y D A T A S H E E T

SECTION 1. - - - - - - - - - CHEMICAL IDENTIFICATION- - - - - - - - - -

CATALOG #: 338826

NAME: ACETIC ACID, GLACIAL, 99.99+%

SECTION 2. - - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - - -

CAS #: 64-19-7

MF: C2H4O2

EC NO: 200-580-7

SYNONYMS

ACETIC ACID (ACGIH:OSHA) * ACETIC ACID, GLACIAL * ACIDE ACETIQUE (FRENCH) * ACIDO ACETICO (ITALIAN) * AZIJNZUUR (DUTCH) * ESSIGSAEURE (GERMAN) * ETHANOIC ACID * ETHYLIC ACID * GLACIAL ACETIC ACID * KYSELINA OCTOVA (CZECH) * METHANECARBOXYLIC ACID * OCTOWY KWAS (POLISH) * VINEGAR ACID *

SECTION 3. - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - - -

LABEL PRECAUTIONARY STATEMENTS

COMBUSTIBLE (USA)

FLAMMABLE (EU)

CORROSIVE

CAUSES SEVERE BURNS.

HARMFUL IN CONTACT WITH SKIN.

LACHRYMATOR.

TARGET ORGAN(S):

TEETH

KIDNEYS

COMBUSTIBLE.

KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING.

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.

WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

SECTION 4. - - - - - - - - - - FIRST-AID MEASURES- - - - - - - - - - -

IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.

CALL A PHYSICIAN.

DO NOT INDUCE VOMITING.

IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

IN CASE OF SKIN CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. REMOVE CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN.

IN CASE OF CONTACT WITH EYES, FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. ASSURE ADEQUATE FLUSHING BY SEPARATING THE EYELIDS WITH FINGERS. CALL A PHYSICIAN.

SECTION 5. - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - - -

EXTINGUISHING MEDIA

CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.

SPECIAL FIREFIGHTING PROCEDURES

WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS

EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - ACCIDENTAL RELEASE MEASURES- - - - - - - - -

WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.

COVER WITH DRY LIME OR SODA ASH, PICK UP, KEEP IN A CLOSED CONTAINER AND HOLD FOR WASTE DISPOSAL.

VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

EVACUATE AREA.

SECTION 7. - - - - - - - - - - HANDLING AND STORAGE- - - - - - - - - - -

REFER TO SECTION 8.

SECTION 8. - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION- - - - - -

SAFETY SHOWER AND EYE BATH.

USE ONLY IN A CHEMICAL FUME HOOD.

WASH CONTAMINATED CLOTHING BEFORE REUSE.

DISCARD CONTAMINATED SHOES.

WASH THOROUGHLY AFTER HANDLING.

DO NOT BREATHE VAPOR.

DO NOT GET IN EYES, ON SKIN, ON CLOTHING.

AVOID PROLONGED OR REPEATED EXPOSURE.

NIOSH/MSHA-APPROVED RESPIRATOR.

COMPATIBLE CHEMICAL-RESISTANT GLOVES.

CHEMICAL SAFETY GOGGLES.

FACESHIELD (8-INCH MINIMUM).

KEEP TIGHTLY CLOSED.

STORE IN A COOL DRY PLACE.

SECTION 9. - - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - - -

APPEARANCE AND ODOR

COLORLESS LIQUID

PHYSICAL PROPERTIES

BOILING POINT: 117 C TO 118 C

MELTING POINT: 16.2 C

FLASHPOINT 104 F

EXPLOSION LIMITS IN AIR:

UPPER 19.9%

LOWER 4%

AUTOIGNITION TEMPERATURE: 960 F

VAPOR PRESSURE: 11MM 20 C

SOLUBILITY:

WATER -Z1079

MISCIBLE WITH A

GLYCEROL, ACETO

SPECIFIC GRAVITY: 1.049

VAPOR DENSITY: 2.1

FREEZING POINT: 16.7 C

PH: 2.4

SWISS POISON CLASS: 3

SECTION 10. - - - - - - - - -STABILITY AND REACTIVITY - - - - - - - - -

STABILITY

STABLE.

INCOMPATIBILITIES

PROTECT FROM MOISTURE.
OXIDIZING AGENTS
SOLUBLE CARBONATES AND PHOSPHATES
HYDROXIDES
OXIDES
METALS
PEROXIDES
PERMANGANATES
AMINES
ALCOHOLS

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS

CARBON MONOXIDE, CARBON DIOXIDE

HAZARDOUS POLYMERIZATION

WILL NOT OCCUR.

SECTION 11. - - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - - - -

ACUTE EFFECTS

CAUSES BURNS.
HARMFUL IF ABSORBED THROUGH SKIN.
MAY BE HARMFUL IF INHALED.
MATERIAL IS EXTREMELY DESTRUCTIVE TO THE TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
MAY BE HARMFUL IF SWALLOWED.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY RESULT IN SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
INGESTION OR INHALATION OF CONCENTRATED ACETIC ACID CAUSES DAMAGE TO TISSUES OF THE RESPIRATORY AND DIGESTIVE TRACTS. SYMPTOMS INCLUDE: HEMATEMESIS, BLOODY DIARRHEA, EDEMA AND/OR PERFORATION OF THE ESOPHAGUS AND PYLORUS, HEMATURIA, ANURIA, UREMIA, ALBUMINURIA, HEMOLYSIS, CONVULSIONS, BRONCHITIS, PULMONARY EDEMA, PNEUMONIA, CARDIOVASCULAR COLLAPSE, SHOCK AND DEATH.
DIRECT CONTACT OR EXPOSURE TO HIGH CONCENTRATIONS OF VAPOR WITH SKIN OR EYES CAN CAUSE: ERYTHEMA, BLISTERS, TISSUE DESTRUCTION WITH SLOW HEALING, SKIN BLACKENING, HYPERKERATOSIS, FISSURES, CORNEAL EROSION, OPACIFICATION, IRITIS, CONJUNCTIVITIS AND POSSIBLE BLINDNESS.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

CHRONIC EFFECTS

TARGET ORGAN(S):
TEETH
KIDNEYS

RTECS #: AF1225000

ACETIC ACID

IRRITATION DATA

SKN-HMN 50 MG/24H MLD	TXAPA9 31,481,1975
SKN-RBT 525 MG OPEN SEV	UCDS** 8/7/1963
SKN-RBT 50 MG/24H MLD	TXAPA9 31,481,1975
EYE-RBT 5 MG/30S RINSE MLD	TXCYAC 23,281,1982

TOXICITY DATA

UNR-MAN LDLO:308 MG/KG	85DCAI 2,73,1970
ORL-RAT LD50:3310 MG/KG	DMDJAP 31,276,1959
IHL-MUS LC50:5620 PPM/1H	MELAAD 48,559,1957
IVN-MUS LD50:525 MG/KG	APTOA6 18,141,1961

SKN-RBT LD50:1060 UL/KG UCDS** 8/7/1963

TARGET ORGAN DATA

SENSE ORGANS AND SPECIAL SENSES (OTHER OLFACTION EFFECTS)

SENSE ORGANS AND SPECIAL SENSES (OTHER EYE EFFECTS)

BEHAVIORAL (CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD)

LUNGS, THORAX OR RESPIRATION (OTHER CHANGES)

GASTROINTESTINAL (CHANGES IN STRUCTURE OR FUNCTION OF ESOPHAGUS)

GASTROINTESTINAL (ULCERATION OR BLEEDING FROM SMALL INTESTINE)

GASTROINTESTINAL (ULCERATION OR BLEEDING FROM LARGE INTESTINE)

EFFECTS ON FERTILITY (MALE FERTILITY INDEX)

EFFECTS ON NEWBORN (BEHAVIORAL)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - - - - ECOLOGICAL INFORMATION - - - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - - - - DISPOSAL CONSIDERATIONS - - - - - - - - -

THIS COMBUSTIBLE MATERIAL MAY BE BURNED IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER.

OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - - - TRANSPORT INFORMATION - - - - - - - - - -

CONTACT ALDRICH CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - - REGULATORY INFORMATION - - - - - - - - - -

EUROPEAN INFORMATION

EC INDEX NO: 607-002-00-6

FLAMMABLE

CORROSIVE

R 10

FLAMMABLE.

R 35

CAUSES SEVERE BURNS.

S 26

IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.

S 36/37/39

WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

S 45

IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK

ACGIH TLV-STEL 15 PPM DTLVS* TLV/BEI,1999

ACGIH TLV-TWA 10 PPM DTLVS* TLV/BEI,1999

EPA FIFRA 1988 PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION
FEREAC 54,7740,1989

MSHA STANDARD-AIR:TWA 10 PPM (25 MG/M3)
DTLVS* 3,2,1971

OSHA PEL (GEN INDU):8H TWA 10 PPM (25 MG/M3)
CFRGBR 29,1910.1000,1994

OSHA PEL (CONSTRUC):8H TWA 10 PPM (25 MG/M3)
CFRGBR 29,1926.55,1994

OSHA PEL (SHIPYARD):8H TWA 10 PPM (25 MG/M3)
CFRGBR 29,1915.1000,1993

OSHA PEL (FED CONT):8H TWA 10 PPM (25 MG/M3)
CFRGBR 41,50-204.50,1994

OEL-AUSTRALIA: TWA 10 PPM (25 MG/M3), STEL 15 PPM, JAN1993

OEL-AUSTRIA: MAK 10 PPM (25 MG/M3), JAN1999
OEL-BELGIUM: TWA 10 PPM (25 MG/M3), STEL 15 PPM, JAN1993
OEL-DENMARK: TWA 10 PPM (25 MG/M3), JAN1999
OEL-FINLAND: TWA 10 PPM (25 MG/M3), STEL 15 PPM (37 MG/M3), SKIN, JAN1993
OEL-FRANCE: VLE 10 PPM (25 MG/M3), JAN1999
OEL-GERMANY: MAK 10 PPM (25 MG/M3), JAN1999
OEL-HUNGARY: TWA 10 MG/M3, STEL 20 MG/M3, JAN1993
OEL-INDIA: TWA 10 PPM (25 MG/M3), STEL 15 PPM (37 MG/M3), JAN1993
OEL-JAPAN: OEL 10 PPM (25 MG/M3), JAN1999
OEL-THE NETHERLANDS: MAC-TGG 10 PPM (25 MG/M3), JAN1999
OEL-NORWAY: TWA 10 PPM (25 MG/M3), JAN1999
OEL-THE PHILIPPINES: TWA 10 PPM (25 MG/M3), JAN1993
OEL-POLAND: MAC(TWA) 5 MG/M3, MAC(STEL) 35 MG/M3, JAN1999
OEL-RUSSIA: TWA 10 PPM, STEL 5 MG/M3, SKIN, JAN1993
OEL-SWEDEN: NGV 5 PPM (13 MG/M3), KTV 10 PPM (25 MG/M3), JAN1999
OEL-SWITZERLAND: MAK-W 10 PPM (25 MG/M3), KZG-W 20 PPM (50 MG/M3), JAN1999
OEL-THAILAND: TWA 10 PPM (25 MG/M3), JAN1993
OEL-TURKEY: TWA 10 PPM (25 MG/M3), JAN1993
OEL-UNITED KINGDOM: TWA 10 PPM (25 MG/M3), STEL 15 PPM (37 MG/M3), SEP2000
OEL IN ARGENTINA, BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV;
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO ACETIC ACID-AIR:10H TWA 10 PPM;STEL 15 PPM
NIOSH' DHHS #92-100,1992
NOHS 1974: HZD 01568; NIS 264; TNF 51469; NOS 150; TNE 486503
NOES 1983: HZD 01568; NIS 266; TNF 49403; NOS 169; TNE 907205; TFE 322123
EPA GENETOX PROGRAM 1988, NEGATIVE: HISTIDINE REVERSION-AMES TEST
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES
EPA TSCA SECTION 8(E) RISK NOTIFICATION, 8EHQ-0892-9237;8EHQ-0892-9238
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JANUARY 2001
NIOSH ANALYTICAL METHOD, 1994: ACETIC ACID, 1603
OSHA ANALYTICAL METHOD #ID-118

SECTION 16. - - - - - - - - - - OTHER INFORMATION- - - - - - - - - - - -

The MSDS format adheres to the standards and regulatory requirements of the United States and may not meet regulatory requirements in other countries.

Ammonium Chloride Solution
0538PP Revised 30-MAR-2003

CHEMICAL PRODUCT/COMPANY IDENTIFICATION

Company Identification

MANUFACTURER/DISTRIBUTOR
DuPont
1007 Market Street
Wilmington, DE 19898

PHONE NUMBERS
Product Information : 1-800-441-7515 (outside the U.S. 302-774-1000)
Transport Emergency : CHEMTREC 1-800-424-9300(outside U.S. 703-527-3887)
Medical Emergency : 1-800-441-3637 (outside the U.S. 302-774-1000)

COMPOSITION/INFORMATION ON INGREDIENTS

Components

Material	CAS Number	%
Water	7732-18-5	69-85
Ammonium Chloride	12125-02-9	15-31
Isopropyl Alcohol	67-63-0	0-0.3

Components (Remarks)

Ammonium salts generate ammonia in water. For SARA 313 requirements, 10% of the total ammonia present in aqueous ammonia solutions is reportable.

HAZARDS IDENTIFICATION

Potential Health Effects

Ammonium Chloride may irritate eyes, nose and throat. Ingestion may cause nausea, headache, weakness, upper abdominal pain, "heart burn", vomiting, diarrhea and liver effects.

Significant skin permeation, and systemic toxicity, after contact with Ammonium Chloride appears unlikely. There are no reports of human sensitization.

Eye contact with Ammonium Chloride may include eye irritation with discomfort, tearing, or blurring of vision.

Inhalation of Ammonium Chloride may include irritation of

(HAZARDS IDENTIFICATION - Continued)

the upper respiratory passages, with coughing and discomfort.

Ingestion of Ammonium Chloride may include nonspecific discomfort, such as nausea, headache, or weakness; abnormal liver function as detected by laboratory tests; or gastrointestinal irritation with upper abdominal pain, "heart burn", nausea, vomiting, and diarrhea.

Individuals with preexisting diseases of the liver, kidney or bladder may have increased susceptibility to the toxicity of excessive exposures. No adequate epidemiologic studies are available for ammonium chloride.

Carcinogenicity Information

None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid

INHALATION

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT

The compound is not likely to be hazardous by skin contact but cleansing the skin after use is advisable.

EYE CONTACT

In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

INGESTION

If swallowed, immediately give 2 glasses of water and induce vomiting. Never give anything by mouth to an unconscious person. Call a physician.

FIRE FIGHTING MEASURES

Flammable Properties

Flash Point : Does not flash

If solids are overheated, >260-315 degC (500-599 degF), HCL and NH3 may be evolved.

Extinguishing Media

Use media appropriate for surrounding material.

Fire Fighting Instructions

Wear self-contained breathing apparatus (SCBA) and full protective equipment.

ACCIDENTAL RELEASE MEASURES

Safeguards (Personnel)

NOTE: Review FIRE FIGHTING MEASURES and HANDLING (PERSONNEL) sections before proceeding with clean-up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean-up.

Initial Containment

Dike spill.

Spill Clean Up

Soak up with sawdust, sand, oil dry or other absorbent material.

HANDLING AND STORAGE

Handling (Personnel)

Avoid breathing vapors or mist. Avoid contact with eyes, skin, or clothing. Wash thoroughly after handling.

Handling (Physical Aspects)

Close container after each use. Keep container tightly closed.

Storage

Store in a well ventilated place. Keep container tightly closed.

EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls

Use only with adequate ventilation. Keep container tightly closed.

Personal Protective Equipment

EYE/FACE PROTECTION

Wear safety glasses or coverall chemical splash goggles.

RESPIRATORS

Wear NIOSH approved respiratory protection, as appropriate.

PROTECTIVE CLOTHING

Where there is potential for skin contact have available, and wear as appropriate, impervious gloves, apron, pants, and jacket.

Exposure Guidelines

Applicable Exposure Limits

Ammonium Chloride		
PEL (OSHA)	:	None Established
TLV (ACGIH)	:	10 mg/m3, 8 Hr. TWA STEL 20 mg/m3
AEL * (DuPont)	:	None Established
Isopropyl Alcohol		
PEL (OSHA)	:	400 ppm, 980 mg/m3, 8 Hr. TWA
TLV (ACGIH)	:	200 ppm, 8 Hr. TWA, A4 STEL 400 ppm
AEL * (DuPont)	:	400 ppm, 8 & 12 Hr. TWA

* AEL is DuPont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

PHYSICAL AND CHEMICAL PROPERTIES

Physical Data

Boiling Point	:	95-100 C (203-212 F)
Freezing Point	:	15 C (59 F) (max.)
pH	:	6.8-7.5
Odor	:	Faint Alcoholic
Form	:	Solution above ~40 degC.
Color	:	Colorless to trace yellow
Specific Gravity	:	1.04-1.07

On cooling, white crystals of ammonium chloride may be present.

STABILITY AND REACTIVITY

Chemical Stability

Stable at normal temperatures and storage conditions.

Solids will sublime with heat and dissociate into HCl and NH3.

Incompatibility with Other Materials

Incompatible with strong alkali (will liberate ammonia on contact), may liberate HCL on contact with strong mineral acids.

Decomposition

Solids will decompose with heat releasing HCl and NH3.

Polymerization

Polymerization will not occur.

Other Hazards

May corrode iron, mild steel and copper containing alloys, particularly if hot.

TOXICOLOGICAL INFORMATION

Animal Data

Ammonium Chloride:

Oral LD50: 1,650 mg/kg in rats

Ammonium Chloride is not a skin irritant, is a mild eye irritant, and is untested for animal sensitization.

A single ingestion exposure to Ammonium Chloride produced changes in liver enzyme activity. Repeated exposure produced acidic urine, reduced growth, enhanced adrenal activity, increased kidney weight and hyperplasia of urinary bladder. A single inhalation exposure produced slight pneumonia and changes in liver, kidney and spleen.

Tests in animals demonstrate no carcinogenic activity. Tests in some animals indicate that Ammonium Chloride may have developmental toxicity but only at levels probably toxic to the adult animal. Tests in animals for reproductive effects have not been performed.

Ammonium Chloride does not produce genetic damage in bacterial cultures but does produce genetic damage in

(TOXICOLOGICAL INFORMATION - Continued)

mammalian cell cultures. It does not produce genetic damage in tests on animals. It has not been tested for heritable genetic damage.

ECOLOGICAL INFORMATION

Ecotoxicological Information

Ammonium Chloride:
96 hour LC50, Fathead minnows: 1.51 mg/L.

DISPOSAL CONSIDERATIONS

Waste Disposal

Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

TRANSPORTATION INFORMATION

Shipping Information

Not regulated by DOT/IMO/IATA when shipped in containers less than 5,000 lbs. of Ammonium Chloride. If greater than 5,000 lbs. of Ammonium Chloride, use:

Proper Shipping Name	: Environmentally Hazardous Substance, Liquid, N.O.S. (Ammonium Chloride)
Hazard Class	: 9
UN Number	: 3082
Packing Group	: III
Label	: Class 9
Reportable Quantity	: 5,000 lbs. Ammonium Chloride

REGULATORY INFORMATION

U.S. Federal Regulations

TSCA Inventory Status : Reported/Included.

TITLE III HAZARD CLASSIFICATIONS SECTIONS 311, 312

Acute	: Yes
Chronic	: No
Fire	: No
Reactivity	: No
Pressure	: No

OTHER INFORMATION

NFPA, NPCA-HMIS

NPCA-HMIS Rating

Health	: 1
Flammability	: 0
Reactivity	: 0

Personal Protection rating to be supplied by user depending on use conditions.

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

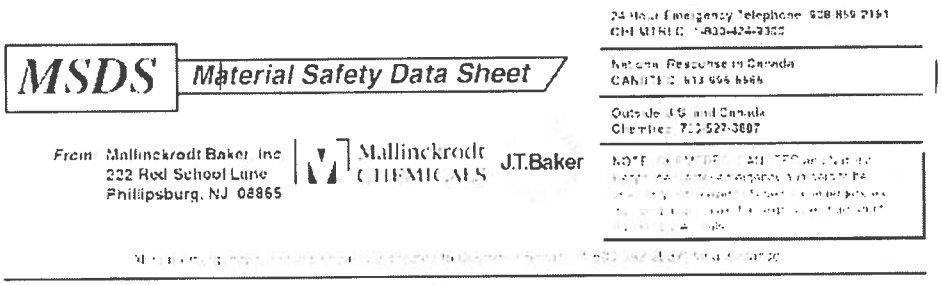
Responsibility for MSDS	: MSDS Coordinator
Address	: DuPont Chemical Solutions Enterprise Wilmington, Delaware 19898
Telephone	: 800-441-7515

# Indicates updated section.

This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained.

End of MSDS

MSDS Number: **A6048** * * * * * *Effective Date:* ***05/04/07*** * * * * * *Supercedes:* ***07/21/04***



AMMONIUM NITRATE

1. Product Identification

Synonyms: Nitric acid, ammonium salt
CAS No.: 6484-52-2
Molecular Weight: 80.04
Chemical Formula: NH4NO3
Product Codes:
J.T. Baker: 0729, 0731, 0829
Mallinckrodt: 3436

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Ammonium Nitrate	6484-52-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSION. MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 1 - Slight
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract; symptoms may include coughing, sore throat, and shortness of breath. At high temperatures, exposure to toxic nitrogen oxides decomposition products can quickly cause acute respiratory problems. Inhalation of large amounts causes systemic acidosis and abnormal hemoglobin.
Ingestion:
Large oral doses of nitrates may cause dizziness, abdominal pain, vomiting, bloody diarrhea, weakness, convulsions, and collapse. Harmful if swallowed. May cause methemoglobinemia resulting in cyanosis.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Small repeated oral doses of nitrates may cause weakness, depression, headache, and mental impairment.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Wash thoroughly with running water. Get medical advice if irritation develops.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. May support combustion in an existing fire.
Explosion:
Contact with oxidizable substances may cause extremely violent combustion. Sealed containers may rupture when heated. Sensitive to mechanical impact.
Fire Extinguishing Media:
Use flooding amounts of water in early stages of fire involving ammonium nitrate. Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove sources of heat and ignition.

Collected waste may be transferred to a closed, preferably metal, container and sent to a RCRA approved waste disposal facility.
Alternatively, sweep spill into noncombustible container and dissolve in large amount of water. Add soda ash. Mix and neutralize with 6M-HCl. Neutralized sludge may be sent to an approved waste disposal facility.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Protect against physical damage. Store in a dry location separate from combustible, organic or other readily oxidizable materials. Avoid storage on wood floors. Remove and dispose of any spilled dichromates; do not return to original containers. Do not store above 54C (130F) preferably below 30C (86F). Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation. A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless crystals.
Odor:
Odorless.
Solubility:
118g/100g water @ 0C (32F).
Specific Gravity:
1.73 @ 23C (77F)
pH:
5.4
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
210C (410F) Decomposes.
Melting Point:

170C (338F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Hygroscopic.
Hazardous Decomposition Products:
Emits nitrous oxides when heated to decomposition. Liberates ammonia in reaction with strong alkalis.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Aluminum, antimony, chromium, copper, iron, lead, magnesium, manganese, nickel, zinc, brass, oil, charcoal, organic material, acetic acid, ammonium chloride, bismuth, cadmium, chlorides, cobalt, phosphorus, potassium and ammonium sulfate, sodium, sodium hypochlorite, sodium perchlorate, sodium-potassium alloy, and sulfure.
Conditions to Avoid:
Heat, flame, ignition sources, dusting and incompatibles. Moisture and combustible materials. Shock sensitive.

11. Toxicological Information

Oral rat LD50: 2217 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Ammonium Nitrate (6484-52-2)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is not expected to evaporate significantly. When released into water, this material is expected to readily biodegrade.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: AMMONIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1942
Packing Group: III
Information reported for product/size: 50KG

International (Water, I.M.O.)

Proper Shipping Name: AMMONIUM NITRATE
Hazard Class: 5.1
UN/NA: UN1942
Packing Group: III
Information reported for product/size: 50KG

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Ammonium Nitrate (6484-52-2)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Ammonium Nitrate (6484-52-2)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Ammonium Nitrate (6484-52-2)	No	No	No	Nitrate cmpd

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Ammonium Nitrate (6484-52-2)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: Yes (Pure / Solid)

Australian Hazchem Code: 1[S]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **3** Other: **Oxidizer**
Label Hazard Warning:
DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE OR EXPLOSION. MAY BE HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

Label Precautions:
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Avoid breathing dust.
Avoid contact with eyes, skin and clothing.
Remove and wash contaminated clothing promptly.
Use only with adequate ventilation.
Wash thoroughly after handling.
Store preferably below 30C

Label First Aid:
If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. In all cases, get medical attention.

Product Use:
Laboratory Reagent.

Revision Information:
No Changes.

Disclaimer:
********** **********

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********** **********

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet
Ammonium Sulfate Solution, Tech Grade

Nulex Company
2717 Port Neal Circle
Sergeant Bluff, IA 51054

MSDS Number: 3020
Date: June 9, 2006
Revision: 1
Replaces: February 7, 2001

SECTION I CHEMICAL PRODUCT AND COMPANY INFORMATION

Product Name/Trade Name:	**Ammonium Sulfate Solution, Tech Grade**		
Synonyms:	Nulex AMS, Ammonium Sulfate Solution 8-0-0-9, 8-0-0-9		
Material Uses:	Agricultural industry: Fertilizer Manufacture of specialty fertilizers Fermentation nutrient		
Supplier/Manufacturer:	Nutra-Flo Company	**Emergency Telephone Number:**	**1-800-424-9300**
Address:	1919 Grand Avenue	**General Telephone Number:**	**1-712-277-2011**
City, State, and Zip Code:	Sioux City, IA 51106		

SECTION II COMPOSITION/INFORMATION ON INGREDIENTS

Component Name	Percentage by Weight	CAS Number
Ammonium Sulfate	33 – 42%	7783-20-2
Water	58 – 67%	7732-18-5

SECTION III HAZARD IDENTIFICATION

EMERGENCY OVERVIEW

Caution! May be harmful if inhaled or swallowed. May cause respiratory tract, eye and skin irritation.

Health Hazards (Ammonium Hydroxide):

Health (Blue)	**2**	**Reactivity**	**0**
Flammability (Red)	0	**Other (White)**	**0**

Routes of Exposure:

- ☑ Swallowing
- ☑ Skin Absorption
- ☑ Inhalation
- ☑ Skin Contact
- ☑ Eye Contact

Effects of Single (Acute) Overexposure:

Swallowing: May result in indigestion, nausea and/or vomiting.
Skin Absorption: No evidence of adverse effects from available information.
Inhalation: May cause nasal stuffiness, cough, sore throat. Avoid breathing vapors, mists.
Skin Contact: May cause irritation. Avoid contact with open wounds. No long term harmful effects are expected.

Eye Contact: May cause severe irritation with corneal injury. May result in blindness. If splashed in eyes, rinse immediately with water for 15 minutes.

Effects of Repeated (Chronic) Overexposure: No information found.

SECTION IV: FIRST AID MEASURES

Inhalation: Move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Seek immediate medical attention.

Ingestion: Do NOT induce vomiting unless directed to do so by medical personnel. If large quantities have been ingested, seek immediate medical attention.

Eye Contact: Flush with water for a minimum of 15 minutes. Seek immediate medical attention.

Skin: Immediately flush skin with plenty of water. Cover irritated skin with an emollient. Remove contaminated clothing and shoes.

SECTION V: FIRE AND EXPLOSION HAZARDS

Flammability: Non-flammable.
Flash Point: Not applicable.
Auto ignition Temperature: Not applicable.
Flammable Limits in Air % by Volume: Not applicable.
Extinguishing Means: Use media appropriate for surrounding materials.
Hazardous Combustion Products: When heated to decomposition, this material will emit toxic fumes containing NO_x, NH_3, and SO_x.

SECTION VI: ACCIDENTAL RELEASE MEASURES

For small or incidental releases, the minimum personal protective equipment should be chemical resistant gloves and goggles. Mop up or absorb with an inert dry material (e.g., vermiculite, dry sand, earth) and place in an appropriate waste disposal container. Rinse affected area with water.

In the event of a significant spill, uncontrolled releases should be responded to by trained personnel using preplanned procedures. Proper personal protective equipment should be used including respiratory protection. Absorb with an inert dry material (e.g., vermiculite, dry sand, earth) and place in an appropriate waste disposal container. Do not use combustible materials such as sawdust. Keep material out of sewers, storm drains, and surface waters.

SECTION VII: HANDLING AND STORAGE

Maximum Storage Temperature: Ambient. Do not store below 10°F.
Handling Practices: Wear gloves and goggles when handling this material. Avoid eye and skin contact.
Storage Practices: Store in a cool, dry, well-ventilated area away from incompatible materials. Keep container /storage vessel closed. Avoid contact with oxidizing agents and acids.

SECTION VIII: EXPOSURE CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT

Engineering Controls: Provide exhaust ventilation or other engineering controls to keep airborne concentrations of vapors below their respective threshold limit values. Ensure eyewash stations and safety showers are proximal to the work-station location.

Respiratory Protection: Wear NIOSH approved vapor respirator.

Protective Gloves: Wear chemical resistant gloves.

Eye Protection: Chemical goggles and a full faceshield should be worn.

SECTION IX PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Odor:	None to slight ammonia odor
Vapor Pressure:	Not determined
Vapor Density:	Not determined
Evaporation Rate:	Not determined
pH:	6.0 – 8.3
Appearance:	Clear to brown liquid
Specific Gravity:	1.19 – 1.23 @ 25°C
Solubility in Water:	78.6 g/100 g @ 25°C
Boiling Point:	220°F

SECTION X: REACTIVITY DATA

Chemical Stability: Stable
Incompatibility with Other Substances: Strong acids and oxidizers
Hazardous Polymerization: Will not occur.
Conditions to Avoid: High temperatures

SECTION XI: TOXICOLOGICAL DATA

LD_{50}: 2840 mg/kg (orl-rat)
Suspected Carcinogen: No

SECTION XII: ECOLOGICAL INFORMATION

Stability: Material is stable under ordinary conditions.
Ecotoxicity: No information available.

SECTION XIII: DISPOSAL CONSIDERATIONS

Waste Disposal: Waste disposal must be in accordance with local, State, and Federal regulations.
EPA Waste Number: Material is not considered hazardous waste per 40 CFR Section 261, Subparts C and D.

SECTION XIV: TRANSPORT INFORMATION

Proper Shipping Name:	Not regulated.
Hazardous Class Number & Description:	Not regulated.
UN Identification Number:	Not regulated
Packing Group:	Not regulated
DOT Label(s) Required:	None
Emergency Response Guide Number:	11
DOT RQ:	None

SECTION XV: REGULATORY INFORMATION

SARA Reporting Requirements: This material contains the following chemicals subject to the reporting requirements of SARA Section 313 and 40 CFR 372 (from water dissociable ammonium salt):

Name	CAS No.	Weight %	% Reportable
Ammonia	7664-41-7	9.6%	0.97

TSCA Inventory Status:	Ammonium sulfate and water are listed on the TSCA Inventory.
Marine Pollutant:	Does not contain any material listed as a Marine Pollutant under 49 CFR 172.101
California Proposition 65:	Not found
CERCLA Reportable Quantities:	None
State Regulatory Information:	Not applicable

Labeling (Precautionary Statement): CAUTION. May cause irritation of eyes, nose, throat, and skin. Do not ingest. Avoid breathing mists and vapors. Wear appropriate personal protective equipment. Wash thoroughly after handling.

SECTION XVI: OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references. This information is furnished free of charge and is based on data believed to be reliable. It is intended for use by persons possessing technical knowledge and should be used at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by Nutra-Flo Company in conjunction with the use of this information. Nothing herein is to be construed as a recommendation to infringe on any patents.

MATERIAL SAFETY DATA SHEET

AMMONIUM THIOSULFATE

Effective Date: 06/01/01
Revised 02/12/03

6 Pages

Section 1:	CHEMICAL PRODUCT and COMPANY IDENTIFICATION

1.1	**Product Name:**	**Ammonium Thiosulfate Solution**
	Chemical Family:	Inorganic Salt Solution
	Synonyms:	Ammonium Thiosulfate, Ammonium Hyposulfite, 12-0-0-26S, ATS
	Formula:	$(NH_4)_2S_2O_3$
1.2	Manufacturer:	Poole Chemical Co., Inc P.O. Box 10 Texline, TX 79087
	Information:	(806) 362-4261
1.3	Emergency Contact:	(806) 362-4215 (Poole Chemical Co., Inc.) (800) 424-9300 (Chemtrec)

Section 2:	COMPOSITION, INFORMATION ON INGREDIENTS

2.1 Chemical Ingredients (% by wt.)

Ammonium Thiosulfate	CAS # 7783-18-8	60% (Typical)
Water	CAS # 7732-18-5	40%

(See Section 8 for exposure guidelines)

Section 3:	HAZARDS IDENTIFICATION

NFPA	Health - 2	Flammability – 0	Reactivity – 0

EMERGENCY OVERVIEW

Contact with eyes may cause irritation or a burning sensation.
Repeated/prolonged skin contact may cause irritation.
Inhalation of product mist may irritate the respiratory tract.
Ingestion may irritate gastrointestinal tract.
Heating may cause ammonia gas to evolve.

3.1 POTENTIAL HEALTH EFFECTS

EYE: Contact with eyes by product mist or solution may cause irritation or a burning sensation.

SKIN CONTACT: Prolonged or repeated contact with product mist or solution may cause skin irritation.

SKIN ABSORPTION: Absorption is unlikely to occur.

INGESTION: Ingestion of product solution may cause irritation of the gastrointestinal tract to include nausea, vomiting and diarrhea. Ammonium Thiosulfate is considered to have a low toxicity to humans.

INHALATION: Inhalation of product mist may cause irritation of the nose, throat and respiratory tract.

CHRONIC EFFECTS/CARCINOGENICITY: Not listed as a carcinogen by NTP, IARC or OSHA

Section 4: FIRST AID MEASURES

4.1 EYES: Immediately flush with large quantities of water for 15 minutes. Hold eyelids apart during irrigation to insure thorough flushing of the entire area of the eye and lids. Obtain medical attention if irritation occurs.

4.2 SKIN: Immediately flush with large quantities of water. Remove contaminated clothing under a safety shower. Obtain medical attention if irritation persists.

4.3 INGESTION: If victim is conscious, give 2 to 4 glasses of water and induce vomiting by touching finger to the back of the throat. Obtain medical attention.

4.4 INHALATION: Remove victim from contaminated atmosphere. If breathing is labored, administer oxygen. If breathing has ceased, clear airway and start mouth to mouth resuscitation. If heart has stopped beating, external heart massage should be applied. Obtain medical attention.

Section 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

FLASH POINT: Not Flammable METHOD USED: NA

5.2 FLAMMABLE LIMITS: LFL: NA UFL: NA

5.3 EXTINGUISHING MEDIA: As appropriate for combustibles involved in fire.

5.4 FIRE & EXPLOSIVE HAZARD: Heating to dryness may cause the release of ammonia, hydrogen sulfide and oxides of sulfur. Sulfur dioxide is a respiratory hazard.

Keep containers/storage fire air cooled with spray water. Heating may cause the release of sulfur dioxide vapors.

5.5 FIRE FIGHTING EQUIPMENT: As in any fire, wear self contained breathing apparatus, pressure demand MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1 Small Releases: Confine and absorb small releases on sand earth or other inert absorbent. Use water spray to dilute to weak fertilizer solution. Dispose of in accordance with all government regulations.

6.2 Large Releases: Confine area to qualified personnel. Shut off release if safe to do so. Dike spill area to prevent runoff into sewers, drains or surface waterways (potential aquatic toxicity). Recover as much of the solution as possible. Treat remaining material as a small release (above).

Section 7: HANDLING and STORAGE

7.1 Handling: Avoid contact with eyes. Use only in a well ventilated area. Wash thoroughly after handling. Avoid prolonged or repeated breathing of vapors. Avoid prolonged or repeated contact with the skin.

7.2 Storage: Store in well ventilated areas. Do not store combustibles in the area of storage vessels. Keep away from any sources of heat or flame. Store tote and smaller containers out of direct sunlight at moderate temperatures. (See Section 10.4 for materials of construction)

Section 8: EXPOSURE CONTROLS, PERSONAL PROTECTION

8.1 Respiratory Protection: None generally required. If conditions exist where mist may be generated, a NIOSH/MSHA approved mist respirator should be worn.

8.2 Skin Protection: Neoprene rubber gloves and apron should be worn to prevent repeated or prolonged contact with the liquid. Wash contaminated clothing prior to reuse.

8.3 EYE PROTECTION: Chemical goggles and a full face shield. DO NOT WEAR CONTACT LENSES.

8.3 Exposure Guidelines:

	OSHA		ACGIH	
	TWA	STEL	TLV	STEL
None	NA	NA	NA	NA

8.4 Engineering Controls: Use adequate exhaust ventilation to prevent inhalation of product vapors. Maintain an eyewash/safety shower in areas where product is handled.

Section 9: PHYSICAL and CHEMICAL PROPERTIES

9.1 APPEARANCE:	Colorless to Pale Yellow Liquid
9.2 ODOR:	No odor.
9.3 BOILING POINT (°F):	210-220
9.4 VAPOR PRESSURE (mmHg):	18 @ 70° F
9.5 VAPOR DENSITY:	Not applicable
9.6 SOLUBILITY IN WATER:	Complete
9.7 SPECIFIC GRAVITY:	1.32-1.35 (11.1 lb/gal.)
9.8 FREEZING POINT:	Not determined
9.9 pH:	7.0 – 8.5
9.10 VOLATILE:	Not volatile

Section 10: STABILITY and REACTIVITY

10.1 STABILITY: This is a stable material.

10.2 HAZARDOUS POLYMERIZATION: Will not occur.

10.3 HAZARDOUS DECOMPOSITION PRODUCTS: Heating this product may evolve ammonia. Heating to dryness will cause the evolution of ammonia, hydrogen sulfide, or sulfur oxide. Ammonia (16-25%) and hydrogen sulfide (4-46%) may form flammable mixtures with air.

10.4 INCOMPATIBILITY: Strong oxidizers such as nitrates, nitrites or chlorates can cause explosions or the release of ammonia, hydrogen sulfide or sulfur oxides. Acids will cause the release of sulfur dioxide, a severe respiratory hazard. Contact with strong alkalies will cause the evolution of ammonia. Avoid storage near oxidizers, strong acids or strong alkalies. Ammonium thiosulfate solution is not compatible with copper, zinc, tin or their alloys. These materials of construction should not be used in handling systems or storage containers for this product. (SEE Section 7.2, Storage)

Section 11: TOXICOLOGICAL INFORMATION

11.1 ORAL: Oral-Rat LD_{50}: 2,850 mg/Kg

11.2 DERMAL: Skin – Rabbit LD_{50}: > 2.000 mg/Kg

11.3 INHALATION: Data not available

11.4 CHRONIC/CARCINOGENICITY: No evidence available

11.5 TERATOLOGY: Data not available

11.6 REPRODUCTION: Data not available

11.7 MUTAGENICITY: Data not available

Section 12: ECOLOGICAL INFORMATION

Static acute 96 hour-LC_{50} for sheepshead minnow is > 1,000 mg/L.
Static acute 96 hour-LC_{50} for mysid shrimp is 89 mg/L.

Section 13: DISPOSAL CONSIDERATIONS

Ammonium Thiosulfate is not considered a hazardous waste under Federal Hazardous Waste Regulations, 40 CFR 261. Consult state and local regulations for different or more restrictive disposal regulations.

Section 14: TRANSPORT INFORMATION

14.1 DOT SHIPPING NAME: Ammonium Thiosulfate Solution

14.2 DOT HAZARD CLASS: NA

14.3 UN/NA NUMBER: NA

14.4 PACKING GROUP: NA

14.5 DOT PLACARD: NA

14.6 DOT LABEL(S): NA

14.7 IMO SHIPPING NAME: Ammonium Thiosulfate Solution

14.8 RQ (Reportable Quantity): NA

Section 15: REGULATORY INFORMATION

15.1 OSHA: This product is listed as a hazardous material under criteria of the Federal OSHA Hazard Communication Standard, 29 CFR 1910.1200.

15.2 SARA TITLE III:

A. EHS (Extremely Hazardous Substance) List: No

B. Section 311/312, (Tier I, II) Categories:

Immediate (acute)	Yes
Fire	No
Sudden Release	No
Reactivity	No
Delayed (chronic)	No

C. Section 313 (Toxic Release Reporting-Form R): yes

Chemical Name	CAS Number	Concentration
Ammonia	7664-41-7	<15%

D. **TPQ** (Threshold Planning Quantity): No

15.3 CERCLA/SUPERFUND: RQ (Reportable Quantity) No

15.4 TSCA (Toxic Substance Control Act) Inventory List: Yes

15.5 RCRA (Resource Conservation and Recovery Act) Status: NA

15.6 WHMIS (Canada) Hazard Classification: NA

15.7 DOT Hazardous Material: (See Section 14) No

15.8 CAA Hazardous Air Pollutant (HAP) No

Section 16:	OTHER INFORMATION

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KOCH NITROGEN COMPANY

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Koch Nitrogen Company
P O Box 2219
Wichita, KS 67201-2219
1-316-828-7672
kochmsds@kochind.com

SPILL/EMERGENCY CONTACT:
CHEMTREC: 1-800-424-9300 (U.S.)
To Request an MSDS: 1-316-828-7672

MSDS NUMBER: 5355

TRADE NAMES:
AMMONIA, ANHYDROUS

SYNONYMS:
AMMONIA, 82-0-0, NH3

CHEMICAL FAMILY: inorganic, alkaline gas or liquid

REVISION DATE: Sep 09 2008

2. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=1 REACTIVITY=0

EMERGENCY OVERVIEW:
SIGNAL WORD: DANGER!
MAJOR HEALTH HAZARDS: harmful if swallowed, harmful or fatal if inhaled, respiratory tract burns, skin burns, eye burns, blindness, frostbite (from compressed gas)
PHYSICAL HAZARDS: Containers may rupture or explode if exposed to heat. May react on contact with water.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: burns, lung congestion, sore throat, cough, difficulty breathing, chest pain, nausea, vomiting, headache, kidney damage, nerve damage, death
LONG TERM EXPOSURE: kidney damage, nerve damage, burns
SKIN CONTACT:
SHORT TERM EXPOSURE: burns, frostbite
LONG TERM EXPOSURE: burns
EYE CONTACT:
SHORT TERM EXPOSURE: burns, frostbite, eye damage, blindness
LONG TERM EXPOSURE: burns, eye damage

INGESTION:
SHORT TERM EXPOSURE: Ingestion is not a route of exposure.
LONG TERM EXPOSURE: Ingestion is not a route of exposure.

3. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: AMMONIA, ANHYDROUS
CAS NUMBER: 7664-41-7
PERCENTAGE: 99-100

COMPONENT: WATER
CAS NUMBER: 7732-18-5
PERCENTAGE: 0-1

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Do not attempt rescue in confined spaces without adequate protective gear and proper training. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Place contaminated clothing in a closed container until laundered or discarded. Contaminated clothing should be removed and laundered before reuse. Notify person laundering clothing of contaminant's hazardous properties. Discard contaminated leather goods. If frostbite or freezing occur, immediately flush with plenty of lukewarm water (105-115 F; 41-46 C). DO NOT USE HOT WATER. If warm water is not available, gently wrap affected parts in blankets. Get immediate medical attention.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 30 minutes. Hold eyelids away from the eyeball to ensure thorough rinsing. Get immediate medical attention.

INGESTION: Ingestion is not a route of exposure.

NOTE TO PHYSICIAN: Signs and symptoms of CNS depression, confusion and convulsions should be considered in the assessment and treatment of victims of exposure.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Slight fire hazard. Moderate explosion hazard. Containers may rupture or explode if exposed to heat.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray. If water is used, a minimum of 100 volumes of water must be available for each volume of ammonia.

FIRE FIGHTING: Do not get water inside container. Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Keep unnecessary people away, isolate hazard area and deny entry. Stop flow of gas. Use extinguishing agents appropriate for surrounding fire. Be aware that a BLEVE (Boiling Liquid Expanding Vapor Explosion) may occur unless surfaces are kept cool with water. Flood with fine water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of

material or combustion by-products. Stay upwind and keep out of low areas. Consider downwind evacuation if material is leaking.

SENSITIVITY TO MECHANICAL IMPACT: Yes

SENSITIVITY TO STATIC DISCHARGE: No

LOWER FLAMMABLE LIMIT: 16%
UPPER FLAMMABLE LIMIT: 25%
AUTOIGNITION: 1204 F (651 C)

HAZARDOUS COMBUSTION PRODUCTS:
Thermal decomposition or combustion products: ammonia, oxides of nitrogen, hydrogen

6. ACCIDENTAL RELEASE MEASURES

AIR RELEASE:
Reduce vapors with water spray. Collect runoff for disposal as potential hazardous waste.

SOIL RELEASE:
Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers. Dike for later disposal. Absorb with sand or other non-combustible material. Add dilute acid.

WATER RELEASE:
Add dilute acid. Collect spilled material using mechanical equipment.

OCCUPATIONAL RELEASE:
Stop leak if possible without personal risk. Reduce vapors with water spray. Do not get water directly on material. Do not get water inside container. Keep unnecessary people away, isolate hazard area and deny entry. Small spills: Flood with water. Evacuation radius: 100 feet. Large spills: Dike for later disposal. Stay upwind and keep out of low areas. Ventilate closed spaces before entering. Evacuation radius: 200 feet. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.101. U.S. OSHA 29 CFR 1910.111. Notify State Emergency Response Commission for storage or use at amounts greater than or equal to the TPQ (U.S. EPA SARA Section 302). SARA Section 303 requires facilities storing a material with a TPQ to participate in local emergency response planning (U.S. EPA 40 CFR 355.30). Keep separated from incompatible substances.

HANDLING: Do not cut, puncture, or weld on or near this container. When using, do not eat, drink or smoke. Subject to handling regulations: U.S. OSHA 29 CFR 1910.119. U.S. OSHA 29 CFR 1910.111.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
AMMONIA, ANHYDROUS:
50 ppm (35 mg/m3) OSHA TWA

35 ppm (27 mg/m3) OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
25 ppm ACGIH TWA
35 ppm ACGIH STEL

VENTILATION: General or local exhaust ventilation and other forms of engineering controls are the preferred means for controlling exposures. If ventilation cannot reduce airborne concentrations below acceptable limits, appropriate respiratory protection should be used.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

PROTECTIVE MATERIAL TYPES: butyl rubber, neoprene, nitrile butadiene rubber (NBR), polyvinyl chloride (PVC)

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 300 ppm

RESPIRATOR: A NIOSH approved air-purifying respirator with an appropriate cartridge or canister may be appropriate under certain circumstances where airborne concentrations are expected to exceed exposure limits. Appropriate respirator selection should be made by a qualified professional as part of a comprehensive respiratory protection program as described in 29 CFR 1910.134. Protection provided by air-purifying respirators is limited and should not be used in atmospheres deficient in oxygen or where airborne concentrations are immediately dangerous to life or health. Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: gas
COLOR: colorless
PHYSICAL FORM: compressed, liquefied gas
ODOR: pungent odor, irritating odor
MOLECULAR WEIGHT: 17.03
MOLECULAR FORMULA: N-H3
BOILING POINT: -28.1 F (-33.4 C)
FREEZING POINT: -30.8 F (-34.9 C) (20% solution)
VAPOR PRESSURE: 124 psia @ 20 C
VAPOR DENSITY (air=1): 0.6 @ 0 C
SPECIFIC GRAVITY (water=1): 0.633 @ 4 C
BULK DENSITY: 620 kg/m3 @ 16 C
WATER SOLUBILITY: 34% @ 20 C
PH: 11.7 approximate(1% aqueous solution)
VOLATILITY: 100%
ODOR THRESHOLD: 15-17 ppm
EVAPORATION RATE: Not applicable
VISCOSITY: 0.266 cP @ -34 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not applicable

10. STABILITY AND REACTIVITY

REACTIVITY: May react with evolution of heat on contact with water

CONDITIONS TO AVOID: Minimize contact with material. Avoid inhalation of material or combustion by-products. Containers may rupture or explode if exposed to heat

INCOMPATIBILITIES: acids, bromine, calcium, chlorine, hypochlorite, iodine, mercury, oxidizing materials, silver

HAZARDOUS DECOMPOSITION:
Thermal decomposition or combustion products: ammonia, oxides of nitrogen, hydrogen
Thermal decomposition products: Decomposition temperature may be lowered to 575 F (302 C) by contact with certain metals, such as nickel.

POLYMERIZATION: Will not polymerize

11. TOXICOLOGICAL INFORMATION

AMMONIA, ANHYDROUS:
TOXICITY DATA: 2000 ppm/4 hour(s) inhalation-rat LC50; 350 mg/kg oral-rat LD50
LOCAL EFFECTS:
Corrosive: inhalation, skin, eye, ingestion
ACUTE TOXICITY LEVEL:
Toxic: ingestion
Moderately Toxic: inhalation
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: diabetes, eye disorders, liver disorders, nervous system disorders, kidney disorders, respiratory disorders, skin disorders and allergies

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:
FISH TOXICITY: 21.4 - 279 mg (total NH3/L) 96 hour LC50 Fish

INVERTEBRATE TOXICITY: 735 mg (total NH3/L) 48 hours LC50 Daphnia

13. DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D002. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ammonia, anhydrous
ID NUMBER: UN1005
HAZARD CLASS OR DIVISION: 2.2
LABELING REQUIREMENTS: 2.2
QUANTITY LIMITATIONS:

PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: Forbidden
DOT HAZARDOUS SUBSTANCE(S):
Ammonia 100 lb(s) (45.4 kg(s))

INTERNATIONAL U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Ammonia, anhydrous
ID NUMBER: UN1005
HAZARD CLASS OR DIVISION: 2.3
LABELING REQUIREMENTS: 2.3, 8
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: Forbidden
CARGO AIRCRAFT ONLY: Forbidden

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Anhydrous ammonia
UN NUMBER: UN1005
CLASS: 2.3; 8

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
AMMONIA, ANHYDROUS: 100 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
AMMONIA, ANHYDROUS: 500 LBS TPQ

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40):
AMMONIA, ANHYDROUS: 100 LBS RQ

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: Yes
FIRE: No
REACTIVE: No
SUDDEN RELEASE: Yes

SARA TITLE III SECTION 313 (40 CFR 372.65):
AMMONIA, ANHYDROUS

OSHA PROCESS SAFETY (29CFR1910.119):
AMMONIA, ANHYDROUS: 10000 LBS TQ

CLEAN AIR ACT: This product contains one or more components listed as a hazardous air pollutant under Title III of the Clean Air Act Amendment of 1990.

STATE REGULATIONS:
California Proposition 65: Not regulated.

NEW JERSEY WORKER AND COMMUNITY RIGHT TO KNOW: This MSDS was prepared in accordance with the New Jersey Worker and Community Right-to-Know Act.

PENNSYLVANIA RIGHT TO KNOW: This MSDS was prepared in accordance with the Pennsylvania Worker and Community Right-to-Know Act.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: A, D1A, E.

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): All the components of this substance are listed on or are exempt from the inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): All of the components of this product are listed on the DSL

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
14. TRANSPORT INFORMATION

NOTICE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, MSDS may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, expressed or implied, is made as to the accuracy or comprehensiveness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

MATERIAL SAFETY DATA SHEET

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): APK 4108

MANUFACTURER'S NAME: Nulex, Inc.

ADDRESS: 2717 Port Neal Circle
Sergeant Bluff, IA 51054

EMERGENCY PHONE: Chemtrec 1-800-424-9300 - 24 hrs a day

BUSINESS PHONE: 712-277-2011

DATE OF PREPARATION: September 24, 2008

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV TWA	STEL	PEL	STEL	IDLH	NIOSH REL
Potassium Orthophosphate, Monobasic (KH_2PO_4)	7778-77-0	10-20	NE	NE	NE	NE	NE	NE
Potassium Orthophosphate, Dibasic (K_2HPO_4)	7758-11-4	5-10	NE	NE	NE	NE	NE	NE
Ammonium Orthophosphate, Dibasic [$(NH_4)_2HPO_4$]	7783-28-0	15-25	NE	NE	NE	NE	NE	NE
Water	7732-18-5	Balance	NE	NE	NE	NE	NE	NE

NE*=NOT ESTABLISHED NA*= NOT AVAILABLE

3. HAZARD IDENTIFICATION

NFPA Rating (Scale 0-4) Health=1 Fire=0 Reactivity=0

Ingestion: May result in nausea, vomiting, diarrhea, bluish skin color, digestive disorders, or chemical burns.

Inhalation: Mist inhalation can result in irritation to the lungs, coughing, choking, difficulty in breathing, lung congestion, or chemical burns.

Skin: Can result in irritation, itching, tingling sensation, and chemical burns.

Chronic: No evidence of chronic effects found.

4. FIRST-AID MEASURES

IF INHALED: Move to fresh air. If the person is having trouble breathing, administer oxygen and get medical assistance.

IN CASE OF EYE CONTACT: Flush eyes with water immediately for 15-30 minutes. Consult a physician if irritation persists or vision is blurred.

IN CASE OF SKIN CONTACT: Remove contaminated clothing and flush skin with water immediately for 15-30 minutes. Wash affected areas with soap when available. If irritation persists, get medical attention.

IN CASE OF INGESTION: Call the poison control center and follow instructions. If victim is vomiting, roll on side to prevent choking.

5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method):	Not flammable	
AUTOIGNITION TEMPERATURE, °C:	Not flammable	
FLAMMABLE LIMITS (in air by volume, %):	Not flammable	

FIRE EXTINGUISHING MATERIALS: Use material suitable for surrounding fire. Several ingredients are actually used as fire retardants.

Water Spray:	X	Carbon Dioxide:	X		
Foam:	X	Dry Chemical:	X	Halon:	X

SPECIAL FIRE FIGHTING PROCEDURES: Wear full protective clothing and self-contained breathing apparatus. Use water spray to cool containers and control vapors.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Can release ammonia , nitrous oxide fumes, cyanides, oxides of carbon and phosphorous oxide fumes.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: For small or incidental releases, the minimum personal protective equipment should be chemical resistant gloves and goggles. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. Gas masks with ammonia canister or SCBA may be required. For large spills, contain by diking with soil or other non-combustible absorbent material. Dilution with water will reduce the possibility of vapor release. Keep material out of sewers, storm drains, and surface waters. Comply with all applicable governmental regulations on spill reporting, handling, and disposal of waste. You may be able to reuse the recovered liquid.

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Avoid getting chemicals **ON YOU** or **IN YOU**. Wash hands after handling chemicals. Do not eat or drink while handling chemicals. Remove any contaminated clothing and wash before reuse.

HANDLING PRACTICES: Wear gloves and other protective clothing when handling this material. Do not get in eyes, on skin, or on clothing.

STORAGE PRACTICES: Store in a cool, dry, well ventilated area away from incompatible materials. This product can be stored in well maintained vessels constructed of mild steel, stainless steel, fiberglass, polypropylene, or polyethylene. Valves should be inspected on a regular basis and replaced as needed to prevent leakage. Flanged valves, instead of screwed valves, are recommended on storage tanks. Aluminum or aluminum alloys should **NOT** be used to store or transport this produce. Bronze, brass, or copper alloys are **NOT** compatible with this product.

VENTING: Vessels should be vented in accordance with the manufacturer's recommendations. The vent should be constructed as to prevent rainwater from entering the vessel.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation.

RESPIRATORY PROTECTION: None normally required. However, if mists are present, wear a NIOSH approved canister respirator, supplied-air respirator, or SCBA.

EYE PROTECTION: Tight fitting goggles should be worn unless a full face respirator is used. Never wear contact lens when handling chemicals.

HAND PROTECTION: Wear chemical resistant gloves.

BODY PROTECTION: Wear chemical resistant clothing. If splashing is expected, wear a chemical resistant apron or suit.

OTHER PROTECTIVE MEASURES: An eyewash and safety shower should be available for use.

9. PHYSICAL AND CHEMICAL PROPERTIES

SPECIFIC GRAVITY @ 68° F:	1.32-1.36	SALTOUT TEMPERATURE:	12 deg F
SOLUBILITY IN WATER:	100%	BOILING POINT:	ND
VAPOR PRESSURE, mm Hg @ 25°C:	ND	pH:	6.5-7.5

APPEARANCE AND COLOR: Material is a clear to cloudy liquid.

HOW TO DETECT THIS SUBSTANCE (warning properties): This liquid is odorless. Possible ammonia odor when heated.

10. STABILITY AND REACTIVITY

STABILITY: Material is stable

CONDITIONS TO AVOID: High temperatures

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Oxidizers, hypochlorites, strong bases, and strong acids

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

SUSPECTED CANCER AGENT: No

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Inhalation of mists could aggravate pre-existing respiratory ailments and trigger allergies. Skin contact could aggravate pre-existing dermatitis.

Dermal Exposure: Skin irritant.

Ingestion Exposure: Nausea and vomiting. Large dose ingestion can cause heart and kidney problems.

Inhalation Exposure: Irritation of nose and throat. Coughing and shortness of breath.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Material will biodegrade.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS:.

Ammonium Orthophosphate LC50 (Rainbow trout) 96 hours 26500 ug/L

Potassium Orthophosphate, Dibasic (Algal Toxicity): 310000 ug/L 20 hours Blue-green algae

Potassium Orthophosphate, Monobasic (Invertebrate Toxicity): 2400 ug/L 28 hours LC50 Polychaete

EFFECT OF CHEMICAL ON AQUATIC LIFE: Not tested.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations.

EPA WASTE NUMBER: As shipped, material would not be a hazardous waste per 40 CFR section 261, Subpart C and D.

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	This material is not regulated under 49 CFR Part 172
HAZARD CLASS NUMBER AND DESCRIPTION:	None
UN IDENTIFICATION NUMBER:	None
PACKING GROUP:	None
DOT LABEL(S) REQUIRED:	None
EMERGENCY RESPONSE GUIDE NUMBER:	171
RQ:	None

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: None of the materials listed as components or ingredients are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

TSCA INVENTORY STATUS: Ingredients of this material are listed on the TSCA inventory.

MARINE POLLUTANT: This product does not contain any material listed as a Marine Pollutant under 49 CFR 172.101.

CALIFORNIA PROPOSITION 65: No

CERCLA REPORTABLE QUANTITIES (RQ): None

STATE REGULATORY INFORMATION: NA

LABELING (Precautionary Statements): WARNING! EYE AND SKIN IRRITANT

16. OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references including, NIOSH, OSHA, ANSI , STN, and NFPA. This information is furnished free of charge and is based on data believed to be reliable. It is intended for use by persons possessing technical knowledge at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by Nulex, Inc. in conjunction with the use of this information. Nothing herein is to be construed as a recommendation to infringe any patents.

MATERIAL SAFETY DATA SHEET

PART 1 *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

TRADE NAME (AS LABELED): AQUA AMMONIA

MANUFACTURER'S NAME: Nulex, Inc.

ADDRESS: 1919 Grand Avenue
Sioux City, IA 51106

EMERGENCY PHONE: Chemtrec 1-800-424-9300 24 hrs a day

BUSINESS PHONE: 712-277-2011

DATE OF PREPARATION: January 25, 2002

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	% w/w	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV TWA PPM	STEL PPM	PEL PPM	STEL PPM	IDLH PPM	NIOSH REL PPM
Ammonium Hydroxide NH_4OH	1336-21-6	40-62	25 (NH_4)	35 (NH_4)	50 (NH_4)	35 (NH_4)	500 (NH_4)	CL 50 (ammonia)
Water H_2O	7732-18-5	Balance	NE	NE	NE	NE	NE	NE

NE*=NOT ESTABLISHED **NA*= NOT AVAILABLE**

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Corrosive. Harmful if swallowed. Can cause respiratory tract burns, skin burns, eye burns, and mucous membrane burns.	HAZARDOUS MATERIAL INFORMATION SYSTEM NFPA HAZARD RATING LEAST: 0 SLIGHT: 1 MODERATE: 2 HIGH: 3 EXTREME: 4
SYMPTOMS OF OVER EXPOSURE BY ROUTE OF EXPOSURE:	HEALTH (BLUE) 3
INHALATION: ACUTE: Can irritate or burn the membranes of the respiratory system if mists or vapors are inhaled. CHRONIC: Same as short-term exposure.	FLAMMABILITY (RED) 0
CONTACT WITH SKIN or EYES: EYES: Severely irritating to the eyes. Can cause corneal burns resulting in blindness. SKIN: Causes severe irritation, stinging, or burns to the skin.	REACTIVITY (YELLOW) 0
SKIN ABSORPTION: is not known to be a skin absorbing agent.	PROTECTIVE EQUIPMENT
INGESTION: Will cause burns to the digestive tract. A human poison by ingestion.	EYES: SEE SECTION 8 / RESPIRATORY: SEE SECTION 8 / HANDS: SEE SECTION 8 / BODY: SEE SECTION 8
AGGRAVATION OF PREEXISTING MEDICAL CONDITIONS: None found.	For Routine Industrial Application

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

IF INHALED: Remove victim to fresh air. If not breathing administer artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention. Physicians should consider administering oxygen.
IN CASE OF EYE CONTACT: Hold eyelids open and flush with a steady stream of water for 15-30 minutes. If only one eye was involved, ensure that it is lower than the uninvolved eye to prevent contamination. Get immediate medical attention.
IN CASE OF SKIN CONTACT: Remove contaminated clothing and jewelry immediately. Wash with large amounts of water and mild soap until all evidence of the chemical is removed. Get medical attention immediately. Cover burns with sterile dressing.
IN CASE OF INGESTION: If swallowed, **DO NOT INDUCE VOMITING!** Call a physician or poison control center. If victim is conscious, wash out mouth with water and give large quantities of water to drink. To prevent aspiration in the case of vomiting, lay victim on their side with their head lower than the waist. If victim is unconscious, get immediate medical attention. Physicians should consider esophangoscopy.

A copy of the label and/or MSDS should accompany a victim to the doctor or hospital.

5. FIRE-FIGHTING MEASURES

FLASH POINT, °C (method):	ND	
AUTOIGNITION TEMPERATURE, °F:	ND	
FLAMMABLE LIMITS (in air by volume, %):	ND	LEL 16% - UEL 25% for ammonia

FIRE EXTINGUISHING MATERIALS:

Aqua Ammonia, Nulex, Inc.

Not considered to be a fire hazard. You should use extinguishing media applicable to the surrounding fire.

Water Spray:	X	Carbon Dioxide:	X		
Appropriate Foam:	X	Dry Chemical:	X	Halon:	

SPECIAL FIRE FIGHTING PROCEDURES: Use a water spray to cool containers. Ammonia and oxides of nitrogen may be released in a fire. Wear full protective clothing and use a positive-pressure self-contained breathing apparatus (SCBA).

UNUSUAL FIRE AND EXPLOSION HAZARDS: When heated to decomposition, this product will emit toxic fumes. Use of welding or flame emitting equipment on or in a container where ammonia vapors may be present is not recommended unless all ammonia has been purged and the container has been rinsed with water. Closed containers may explode due to excessive internal pressure. May ignite or explode upon contact with combustible materials.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Do not touch spilled material. Stop leak if possible without personal risk. Dike the area using absorbent materials such as sand or clay. Recover and contain as much product as possible. Ventilate the area. For small or incidental releases, the minimum personal protective equipment is rubber gloves, rubber apron, and chemical goggles. Large or uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment will need to be determined based on the presence of ammonia vapors. Full face respirators with appropriate cartridges or SCBA's may be required. Keep material out of sewers, storm drains, and surface waters. Comply with all governmental regulations on spill reporting, handling, and disposal of waste. Spills of 1000 pounds or more are reportable to the National Response Center, State Emergency Response Commission, and Local Emergency planning Commission. Spills into the "Waters of the United States" are also reportable to the National Response Center.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Avoid getting chemicals ON YOU or IN YOU. Wash hands after handling chemicals. Do not eat, drink, or smoke while handling chemicals. Wear all required personal protective equipment.

HANDLING PRACTICES: Wash thoroughly after handling. Do not touch. Do not get in eyes, on skin, or clothing. Do not ingest. Do not exceed PEL/TLV inhalation of vapors.

STORAGE PRACTICES: Store in a cool, dry, well-ventilated area away from incompatible materials. If more than 15000 pounds is stored, requirements of SARA section 302 and 303 apply for participation in local emergency response planning.

VENTING: Vessels should be vented in accordance with manufacturer's recommendations. A pressure/vacuum vent constructed of acceptable materials and providing suitable pressure and vacuum relief is recommended. A pipe vent or T-type vent may be used and constructed in such a manner as to prevent rain water from entering the vessel. During hot weather, ammonia vapors may be released from the tank. A well-designed vent can reduce this ammonia loss.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Do not cut, weld, grind, or drill on vessels containing this material. Vessels must be emptied, cleaned, and tested for explosivity (%LEL-Lower Explosion Limit). (See ANSI-K-93-1976)

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation

RESPIRATORY PROTECTION: If use conditions generate a mist or vapor, wear a NISOH approved respirator appropriate for those emission levels (<250 PPM). This may be either a full face piece respirator with the appropriate cartridge or an SCBA in the pressure demand mode. Over 300 PPM requires a supplied air respirator. Over 500 PPM requires a self contained breathing apparatus.

EYE PROTECTION: Chemical goggles and full face shield unless a full face respirator is worn. It is generally recognized that contact lenses should not be worn when working with chemicals because contact lenses may contribute to the severity of an eye injury.

HAND PROTECTION: Wear chemical resistant gloves compatible with the material.

BODY PROTECTION: Use body protection appropriate for the task. Chemical protective clothing made from rubber, rubber aprons, and alkali resistant coveralls are generally acceptable.

OTHER PROTECTIVE MEASURES: An eyewash and safety shower should be nearby and ready for use.

9. PHYSICAL AND CHEMICAL PROPERTIES

VAPOR DENSITY: Air=1.00	1.2	FREEZING POINT:	-107^0 F
SPECIFIC GRAVITY:	0.880-0.957	BOILING POINT:	97^0 F
SOLUBILITY IN WATER @ 25°C:	Soluble	EVAPORATION RATE:	ND
NITROGEN NOMINAL (8):	21	VOLATILITY:	ND
VAPOR PRESSURE, mm Hg @ 20°C:	115	pH:	11.6 (1 N SOLUTION)

APPEARANCE AND COLOR: Clear, colorless liquid.

HOW TO DETECT THIS SUBSTANCE (warning properties: Pungent ammonia odor.

10. STABILITY AND REACTIVITY

STABILITY: Stable

CONDITIONS TO AVOID: Heat, flames, sparks, and other sources of ignition. Dangerous gases may accumulate in confined spaces. May ignite or explode upon contact with combustibles.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Acids, combustible materials, halogens, metals, metal oxides, oxidizing materials. Reacts violently with acids to form an exothermic reaction. Is corrosive to metals and their alloys.

HAZARDOUS POLYMERIZATION: Will not occur

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:

LD_{50} orl-rat: 350 mg/Kg, LDLo orl-hum: 43 mg/Kg, LCLo inh-hum: 5000 ppm, TCLo inh-hum: 408 ppm

SUSPECTED CANCER AGENT: Not IARC or NTP

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Inhalation of mist or vapors may aggravate pre-existing respiratory aliments.

Dermal Exposure: Redness, irritation, or burns.
Ingestion Exposure: Burns, ulceration, and possibly death.
Inhalation Exposure: Irritation or burns to the nose, throat, and mucous membranes. Concentrations over 500 ppm are IDLH.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: Stable under ordinary conditions. All work practices should be aimed at eliminating environmental contamination.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS: Phytotoxicity - >2500 ug/L 33 months LETH Duckweed

EFFECT OF CHEMICAL ON AQUATIC LIFE: Fish Toxicity – 15000 ug/L 96 hours LC50 Mosquitofish; Invertebrate Toxicity – 10000 ug/L NR hours Crayfish; Algal Toxicity – 6200 ug/L 9 hours Stonewart.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations.

EPA WASTE NUMBER: This material is considered a D002 hazardous waste for disposal purposes. (USEPA 40 CFR 262)

14. TRANSPORTATION INFORMATION

PROPER SHIPPING NAME:	RQ, AMMONIA SOLUTIONS (>10% to <=35% AMMONIA)
HAZARD CLASS NUMBER AND DESCRIPTION:	8
PACKING GROUP:	III
UN IDENTIFICATION NUMBER:	UN 2672
DOT LABEL(S) REQUIRED:	CORROSIVE
EMERGENCY RESPONSE GUIDE NUMBER:	60 USDOT
RQ:	1000 Pounds

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: 15000 pounds TQ under Section 302 and 303. Acute under Section 311/312. Falls under ammonia solutions for Section 313.
TSCA INVENTORY STATUS: Aqua Ammonia is listed on the Registry.
MARINE POLLUTANT: This product contains no component listed as a Marine Pollutant under 49 CFR 172.101, Appendix B.
CALIFORNIA PROPOSITION 65: No information found.
CERCLA REPORTABLE QUANTITIES (RQ): 1000 Pounds
STATE REGULATORY INFORMATION: None found
OSHA PROCESS SAFETY: Covered under 29 CFR 1910.119

LABELING (Precautionary Statements): **DANGER!** may cause burns or irritation of eyes, nose, throat, or skin. Do not ingest. Avoiding breathing mists and sprays. Wear gloves and safety goggles. Work in a well-ventilated area. Wash thoroughly after handling. Have safety shower and eye wash nearby.

16. OTHER INFORMATION

The information and recommendations herein are taken from data contained in independent, industry recognized references including, NIOSH, OSHA, ANSI, and NFPA. This information is furnished free of charge and is based on data believed to be reliable. It is intended for use by persons possessing technical knowledge at their own discretion and risk. Since actual use is beyond our control, no guarantee, express or implied, and no liability is assumed by Nulex, Inc. in conjunction with the use of this information. Nothing herein is to be construed as a recommendation to infringe any patents.

ISO9001 - 2000 certified

Material Safety Data Sheet
Citric acid solutions

ENTERED

Section 1 - Chemical Product and Company Identification

MSDS Name:

Citric acid solutions

Catalog Numbers:

LC13150, LC13180

Synonyms:

Company Identification:

LabChem, Inc.
200 William Pitt Way
Pittsburgh, PA 15238

Company Phone Number:

(412) 826-5230

Emergency Phone Number:

(800) 424-9300

CHEMTREC Phone Number:

(800) 424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name:	Percent
7732-18-5	Water	balance
77-92-9	Citric acid	10-20

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless
May cause eye irritation and possible burns. May cause skin irritation.
Target Organs: none known.

Potential Health Effects

Eye:

May cause moderate eye irritation. May cause conjunctivitis.

Skin:

May cause skin irritation.

Ingestion:

Ingestion may cause sore throat, coughing, nausea, abdominal pain.

Inhalation:

May cause respiratory tract irritation.

Chronic:

May cause conjunctivitis. Repeated skin contact may cause dermatitis and burns

Section 4 - First Aid Measures

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids until no evidence of chemical remains. Get medical aid at once.

Skin:

Get medical aid. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Remove contaminated clothing and shoes.

Ingestion:

Do NOT induce vomiting. Get medical aid at once. Give oxygen if respiration is depressed. If victim is conscious, give 2-4 glasses of water to dilute acid.

Inhalation:

Give artificial respiration if necessary. Get medical aid. Move victim to fresh air.

Notes to Physician:

Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:

Negligible fire and explosion hazard when exposed to heat or flame. Move container if possible, avoid breathing vapors or dust.

Extinguishing Media:

For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

Autoignition Temperature:

1010°C (1,850.00°F)

Flash Point:

NFPA Rating:

CAS# 7732-18-5: Not published
CAS# 77-92-9: Not published.

Explosion Limits:

Lower: 0.28kg/m3 Upper: 2 29 kg/m3

Section 6 - Accidental Release Measures

General Information:

Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb liquid with fly ash or cement powder.

Section 7 - Handling and Storage

Handling:

Wash thoroughly after handling. Avoid breathing dust, vapor, mist, or gas.

Storage:

Store capped at room temperature. Protect from heat and incompatibles.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:

Provide local exhaust or general dilution ventilation.

Exposure Limits

Chemical Name:	ACGIH	NIOSH	OSHA
Water	None of the components are on this list	None of the components are on this list	None of the components are on this list.
Citric acid	None of the components are on this list	None of the components are on this list	None of the components are on this list.

OSHA Vacated PELs

Personal Protective Equipment

Eyes:

Do not wear contact lenses when working with chemicals. An eye wash fountain should be available in the immediate work area. Wear splash-proof safety goggles.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Not required for normal use. Firefighting-- any self-contained breathing apparatus with full facepiece operated in pressure-demand mode.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Color: colorless
Odor: odorless
pH: No information found.
Vapor Pressure: No information found.
Vapor Density: No information found.
Evaporation Rate: No information found.
Viscosity: No information found.
Boiling Point: > 212°F (> 100.00°C)
Freezing/Melting Point: < 32°F (< 0.00°C)

Decomposition Temperature: No information found.
Solubility in water: Soluble.
Specific Gravity/Density: 1 1
Molecular Formula: No information found.
Molecular Weight No information found.

Section 10 - Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures

Conditions to Avoid:
Incompatible materials, alkaline materials.

Incompatibilities with Other Materials
Oxidizing agents.

Hazardous Decomposition Products
No information found.

Hazardous Polymerization
Has not been reported

Section 11 - Toxicological Information

RTECS:
CAS# 7732-18-5: ZC0110000.
CAS# 77-92-9: GE7350000.

LD50/LC50:
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg.
CAS# 77-92-9:
Oral, mouse: LD50 = 5040 mg/kg
Oral, rat: LD50 = 3 gm/kg.

Carcinogenicity:
CAS# 7732-18-5: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.
CAS# 77-92-9: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.

Epidemiology:

Teratogenicity:

Reproductive:

Mutagenicity

Neurotoxicity

Section 12 - Ecological Information

No information found.

Section 13 - Disposal Considerations

Dispose of in accordance with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: Not regulated

Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information

US Federal

TSCA

CAS# 7732-18-5 is listed on the TSCA Inventory.
CAS# 77-92-9 is listed on the TSCA Inventory.

SARA Reportable Quantities (RQ)

None of the components are on this list.

CERCLA/SARA Section 313

None of the components are on this list.

OSHA - Highly Hazardous

None of the components are on this list.

US State

State Right to Know

California Regulations

European/International Regulations

Canadian DSL/NDSL

CAS# 7732-18-5 is listed on Canada's DSL List.
CAS# 77-92-9 is listed on Canada's DSL List.

Canada Ingredient Disclosure List

CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.
CAS# 77-92-9 is listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date: April 19, 1998
Revision Date: March 10, 2004

Material Safety Data Sheet

Citric acid solutions

Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application

MSDS Number: **E0180** * * * * * *Effective Date: **08/03/07** * * * * * Supercedes: **02/16/06***

MSDS Material Safety Data Sheet

From Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

For non-emergency questions about this product, please contact Customer Service at 1-800-582-2537 for assistance.

EDTA, Iron (III) Derivative, Sodium Salt (13% Iron)

1. Product Identification

Synonyms: Sodium Feredetate; Ferric Sodium EDTA
CAS No.: 15708-41-5
Molecular Weight: 367.05
Chemical Formula: C10H12FeN2NaO8
Product Codes: L699

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Feredetate	15708-41-5	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES
Storage Color Code: Green (General Storage)

Potential Health Effects

There is limited information available on the hazards of this chemical. The health effects listed for this substance are based on information found for compounds of similar structure.

Inhalation:
Mild irritant. Symptoms may include coughing or sneezing.
Ingestion:
Substance has low toxicity by ingestion. Large amounts may cause gastric upset due to osmotic imbalance through the sequestering of metal ions. An overdose of iron may cause vomiting, abdominal pain, bloody diarrhea, vomiting blood, lethargy, and shock. In severe cases, toxicity may progress and develop into an increase in acidity in the blood, bluish skin discoloration, fever, liver damage, and possibly death.
Skin Contact:
Mild irritant. Symptoms may include reddening or inflammation on prolonged contact.
Eye Contact:
No adverse effects expected but dust may cause mechanical irritation.
Chronic Exposure:
Ingestion of greater than 50 to 100 mg of iron per day may result in pathological iron deposition in body tissues. Repeated iron ingestion can produce cardiac toxicity.
Aggravation of Pre-existing Conditions:
No adverse health effects expected.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Yellow-brown Powder.
Odor:
Odorless.
Solubility:
Moderate (1-10%)
Specific Gravity:
No information found.
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
No information found.
Melting Point:
No information found.
Vapor Density (Air=1):
Not applicable.
Vapor Pressure (mm Hg):
Not applicable.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Burning may produce carbon monoxide, carbon dioxide, nitrogen oxides.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Oxidizing agents.
Conditions to Avoid:
Incompatibles.

11. Toxicological Information

Oral rat LD50: 5 g/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Feredetate (15708-41-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Sodium Feredetate (15708-41-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Feredetate (15708-41-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Feredetate (15708-41-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Feredetate (15708-41-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 Flammability: 1 Reactivity: 0
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Avoid breathing dust.
Keep container closed.
Use only with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 3.
Disclaimer:
********** **********

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR

RELIANCE UPON THIS INFORMATION.
****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

From Port Neal Nulex Inc.

Jebro Incorporated
Bill Of Lading

Reference Number
526008275

Date
Truck 05/22/2008
Route 526
Proper
Cust. P.O. NO.
EPA I.D. NO IAD020201604
US DOT NO. 245090
US DOT HAZMAT REG. NO. 06 1606 550 0160
EMERGENCY TELEPHONE NO. 1-800-424-9300
Consigned to or sold to:
Jebro Incorporated, 1-800-231-8555

MOTOR CARRIER BILL OF LADING
Received, subject to tariffs and/or contract in effect on date of issurance hereof.

Customer:
EPA ID: n/a
Nulex Co
PORT NEAL
Address 2
Sergeant Bluff, IA 51054

Product	Shipping Description	Gallons or Units		Price	Amount
Used Oil	Used Oil	400	Gal	$0.00	$0.00

Amount Due: $0.00

Mike
251 3226

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation. According to the applicable regulations of the department of transportation.

GENERATOR'S REPRESENTATION

The generator hereby warrants that the material released to the carrier is represented free of hazardous waste under RCRA. Misrepresentation of this material is the generator's legal and financial responsibility to correct the damages.

"This shipment shall be governed by (A) the contract between shipper and carrier, or (B) the terms of the applicable bill of lading form described in the National Motor Freight Classification No. A(. MF-1. C.-9, supplements thereto or reissues thereof, if carrier is a common carrier in a state where the bills of lading have been legally prescribed, this shipment shall be governed by the terms of the applicable bill of lading."

"Carrier certifies that the cargo tank supplied for this shipment is a proper container for this commodity as described by the shipper."

SHIPPER: [signature] CARRIER: Bobby Thompson

Jebro Incorporated, 2303 Bridgeport Drive, Sioux City, IA 51111, (712) 277-8859

12-03-01

BILL OF LADING/MANIFEST

1. Shipper's US EPA ID No. (If Applicable): ~~NED007258213~~ CESQG | Document No.: 50104 | 2. Page 1 of 1

3. Shipper's Name and Mailing Address: ~~MALLINCKRODT~~ NUTRA FLO/KAY DEE FEED 1919 GRAND AVE Sioux City, IA 51106-1118 ~~13434 I ST OMAHA NE 68137~~ ATTN ROGER HINES

4. Shipper's Phone: ~~402 896 1100~~ 712-207-2011

5. Transporter 1 Company Name	6. US EPA ID Number	A. Transporter's Phone
SAFETY-KLEEN SYS. INC.	TXR000050930	800 669-5740
7. Transporter 2 Company Name	8. US EPA ID Number	B. Transporter's Phone

9. Designated Facility Name and Site Address	10. US EPA ID Number	C. Facility's Phone
050597 CLEANLITES RECYCLING INC. 665 HULL RD MASON MI 48854	MIR000016402	517 676-0044

	11. Shipping Name and Description	HM	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
a.	UNIVERSAL WASTE MERCURY-CONTAINING LAMPS (NOT USDOT REGULATED)		1	CF	45	P
b.						
c.						
d.						

15. Special Handling Instruction and Additional Information

MFST R/T#107250415 0000-2456-33
EMERGENCY RESP 800-468-1760(24 HR). IF UNDELIVERABLE RETURN TO GENERATOR.
SK CORP AUTHORIZED TO RETAIN LICENSED SUBSEQUENT CARRIERS AS NECESSARY.

SKDOT# A: 11067 B: C: D:

16a. US DOT HAZARDOUS MATERIALS SHIPPER'S CERTIFICATION: This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Printed/Typed Name | Signature required here if US DOT regulated | Month | Day | Year

16b. NON-REGULATED SHIPPER'S CERTIFICATION: I certify the materials described above on this form are not subject to federal regulations for Transportation or Disposal.

Printed/Typed Name: Roger Kelly | Sign here if material is not DOT regulated: Roger Kelly | Month: 05 | Day: 30 | Year: 07

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Jason Abbott | Signature: [signature] | Month: 05 | Day: 30 | Year: 07

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name | Signature | Month | Day | Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of materials covered by this form except as noted in Item 19.

Printed/Typed Name | Signature | Month | Day | Year

SHIPPER | TRANSPORTER | FACILITY

EVENT OF EMERGENCY CALL 1-800-468-1760 (24 hours)

TRANSPORTER

MSDS by MSDS Number

Our database contains over 10,000 MSDS representing over 80,000 unique product codes. Your search will be more successful if you fill in as much information as possible.

Vopak USA
6100 Carillon Point
Kirkland WA 98033
425-889-3400

For Emergency Assistance involving chemicals call - CHEMTREC (800) 424-8300

MSDS Number:MZP3973 MSDS Version:003

003 02/07/01 PHOSPHORIC ACID

PRODUCT NAME: PHOSPHORIC ACID

MSDS NUMBER: MZP3973

EFFECTIVE DATE: 2/5/2001

SUPERSEDES: 1/4/1999

ISSUED BY: 006614

PHOSPHORIC ACID

1. PRODUCT IDENTIFICATION

SYNONYMS: ORTHO-PHOSPHORIC ACID; WHITE PHOSPHORIC ACID
CAS NO: 7664-38-2
MOLECULAR WEIGHT: 98.00
CHEMICAL FORMULA: H3PO4 IN H2O

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT	CAS NO	PERCENT	HAZARDOUS
PHOSPHORIC ACID	7664-38-2	75 - 95%	YES
WATER	7732-18-5	5 - 25%	NO

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER! CORROSIVE. CAUSES SEVERE IRRITATION AND BURNS TO EVERY AREA OF CONTACT. HARMFUL IF SWALLOWED OR INHALED.

POTENTIAL HEALTH EFFECTS

INHALATION:
INHALATION IS NOT AN EXPECTED HAZARD UNLESS MISTED OR HEATED TO HIGH TEMPERATURES. MIST OR VAPOR INHALATION CAN CAUSE IRRITATION TO THE NOSE, THROAT, AND UPPER RESPIRATORY TRACT. SEVERE EXPOSURES CAN LEAD TO A CHEMICAL PNEUMONITIS.

INGESTION:
CORROSIVE. MAY CAUSE SORE THROAT, ABDOMINAL PAIN, NAUSEA, AND SEVERE BURNS OF THE MOUTH, THROAT, AND STOMACH. SEVERE EXPOSURES CAN LEAD TO SHOCK, CIRCULATORY COLLAPSE, AND DEATH.

SKIN CONTACT:
CORROSIVE. MAY CAUSE REDNESS, PAIN, AND SEVERE SKIN BURNS.

EYE CONTACT:
CORROSIVE. MAY CAUSE REDNESS, PAIN, BLURRED VISION, EYE BURNS, AND PERMANENT EYE DAMAGE.

CHRONIC EXPOSURE:
NO INFORMATION FOUND.

AGGRAVATION OF PRE-EXISTING CONDITIONS:
PERSONS WITH PRE-EXISTING SKIN DISORDERS OR EYE PROBLEMS, OR IMPAIRED RESPIRATORY FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THE SUBSTANCE.

4. FIRST AID MEASURES

INHALATION:
REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN IMMEDIATELY

INGESTION:
IF SWALLOWED, DO NOT INDUCE VOMITING. GIVE LARGE QUANTITIES OF WATER. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN, IMMEDIATELY. WASH CLOTHING BEFORE REUSE.

EYE CONTACT:
IMMEDIATELY FLUSH EYES WITH GENTLE BUT LARGE STREAM OF WATER FOR AT LEAST 15 MINUTES, LIFTING LOWER AND UPPER EYELIDS OCCASIONALLY. CALL A PHYSICIAN IMMEDIATELY.

==========

5. FIRE FIGHTING MEASURES

FIRE:
NOT CONSIDERED TO BE A FIRE HAZARD. CONTACT WITH MOST METALS CAUSES FORMATION OF FLAMMABLE AND EXPLOSIVE HYDROGEN GAS.

EXPLOSION:
NOT CONSIDERED TO BE AN EXPLOSION HAZARD.

FIRE EXTINGUISHING MEDIA:
USE ANY MEANS SUITABLE FOR EXTINGUISHING SURROUNDING FIRE. WATER SPRAY MAY BE USED TO KEEP FIRE EXPOSED CONTAINERS COOL. IF WATER IS USED, USE IN ABUNDANCE TO CONTROL HEAT AND ACID BUILD-UP.

SPECIAL INFORMATION:
IN THE EVENT OF A FIRE, WEAR FULL PROTECTIVE CLOTHING AND NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

==========

6. ACCIDENTAL RELEASE MEASURES

VENTILATE AREA OF LEAK OR SPILL. WEAR APPROPRIATE PERSONAL PROTECTIVE EQUIPMENT AS SPECIFIED IN SECTION 8. ISOLATE HAZARD AREA. KEEP UNNECESSARY AND UNPROTECTED PERSONNEL FROM ENTERING. CONTAIN AND RECOVER LIQUID WHEN POSSIBLE. NEUTRALIZE WITH ALKALINE MATERIAL (SODA ASH, LIME), THEN ABSORB WITH AN INERT MATERIAL (E. G., VERMICULITE, DRY SAND, EARTH), AND PLACE IN A CHEMICAL WASTE CONTAINER. DO NOT USE COMBUSTIBLE MATERIALS, SUCH AS SAW DUST. DO NOT FLUSH TO SEWER! US REGULATIONS (CERCLA) REQUIRE REPORTING SPILLS AND RELEASES TO SOIL, WATER AND AIR IN EXCESS OF REPORTABLE QUANTITIES. THE TOLL FREE NUMBER FOR THE US COAST GUARD NATIONAL RESPONSE CENTER IS (800) 424-8802

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7. HANDLING AND STORAGE

KEEP IN A TIGHTLY CLOSED CONTAINER. PROTECT FROM PHYSICAL DAMAGE. STORE IN A COOL, DRY, VENTILATED AREA AWAY FROM SOURCES OF HEAT, MOISTURE, INCOMPATIBILITIES, AND DIRECT SUNLIGHT. CORROSIVE TO MILD STEEL. STORE IN RUBBER LINED OR 316 STAINLESS STEEL DESIGNED FOR PHOSPHORIC ACID. DO NOT WASH OUT CONTAINER AND USE IT FOR OTHER PURPOSES. WHEN DILUTING, THE ACID

SHOULD ALWAYS BE ADDED SLOWLY TO WATER AND IN SMALL AMOUNTS. NEVER USE HOT WATER AND NEVER ADD WATER TO THE ACID. WATER ADDED TO ACID CAN CAUSE UNCONTROLLED BOILING AND SPLASHING. PROTECT FROM FREEZING. CONTAINERS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTY SINCE THEY RETAIN PRODUCT RESIDUES (VAPORS, LIQUID); OBSERVE ALL WARNINGS AND PRECAUTIONS LISTED FOR THE PRODUCT.

==========

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

AIRBORNE EXPOSURE LIMITS:
OSHA PERMISSIBLE EXPOSURE LIMIT (PEL):
1 MG/M3 (TWA)

-ACGIH THRESHOLD LIMIT VALUE (TLV):
1 MG/M3 (TWA), 3 MG/M3 (STEL)

VENTILATION SYSTEM:
A SYSTEM OF LOCAL AND/OR GENERAL EXHAUST IS RECOMMENDED TO KEEP EMPLOYEE EXPOSURES BELOW THE AIRBORNE EXPOSURE LIMITS. LOCAL EXHAUST VENTILATION IS GENERALLY PREFERRED BECAUSE IT CAN CONTROL THE EMISSIONS OF THE CONTAMINANT AT ITS SOURCE, PREVENTING DISPERSION OF IT INTO THE GENERAL WORK AREA. PLEASE REFER TO THE ACGIH DOCUMENT, "INDUSTRIAL VENTILATION, A MANUAL OF RECOMMENDED PRACTICES", MOST RECENT EDITION, FOR DETAILS.

PERSONAL RESPIRATORS (NIOSH APPROVED):
IF THE EXPOSURE LIMIT IS EXCEEDED, A FULL FACEPIECE RESPIRATOR WITH HIGH EFFICIENCY DUST/MIST FILTER MAY BE WORN UP TO 50 TIMES THE EXPOSURE LIMIT OR THE MAXIMUM USE CONCENTRATION SPECIFIED BY THE APPROPRIATE REGULATORY AGENCY OR RESPIRATOR SUPPLIER, WHICHEVER IS LOWEST. FOR EMERGENCIES OR INSTANCES WHERE THE EXPOSURE LEVELS ARE NOT KNOWN, USE A FULL-FACEPIECE POSITIVE-PRESSURE, AIR-SUPPLIED RESPIRATOR. WARNING: AIR PURIFYING RESPIRATORS DO NOT PROTECT WORKERS IN OXYGEN-DEFICIENT ATMOSPHERES.

SKIN PROTECTION:
WEAR IMPERVIOUS PROTECTIVE CLOTHING, INCLUDING BOOTS, GLOVES, LAB COAT, APRON OR COVERALLS, AS APPROPRIATE, TO PREVENT SKIN CONTACT.

EYE PROTECTION:
USE CHEMICAL SAFETY GOGGLES AND/OR A FULL FACE SHIELD WHERE SPLASHING IS POSSIBLE. MAINTAIN EYE WASH FOUNTAIN AND QUICK-DRENCH FACILITIES IN WORK AREA.

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9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:
CLEAR, COLORLESS SYRUPY LIQUID.

BOILING POINT:
158C (316F)

ODOR:
ODORLESS.

MELTING POINT:
21C (70F)

SOLUBILITY:

VAPOR DENSITY (AIR=1):

MISCIBLE IN ALL PROPORTIONS IN WATER.

3.4

SPECIFIC GRAVITY:
1.69 @ 25C

VAPOR PRESSURE (MM HG):
0.03 @ 20C (68F)

PH:
1.5 (0.1 M AQUEOUS SOLUTION)

EVAPORATION RATE (BUAC=1):
NO INFORMATION FOUND.

% VOLATILES BY VOLUME @ 21C (70F):
100

10. STABILITY AND REACTIVITY

STABILITY:
STABLE UNDER ORDINARY CONDITIONS OF USE AND STORAGE. SUBSTANCE CAN SUPERCOOL WITHOUT CRYSTALLIZING.

HAZARDOUS DECOMPOSITION PRODUCTS:
PHOSPHORUS OXIDES MAY FORM WHEN HEATED TO DECOMPOSITION.

HAZARDOUS POLYMERIZATION:
WILL NOT OCCUR.

INCOMPATIBILITIES:
LIBERATES EXPLOSIVE HYDROGEN GAS WHEN REACTING WITH CHLORIDES AND STAINLESS STEEL. CAN REACT VIOLENTLY WITH SODIUM TETRAHYDROBORATE. EXOTHERMIC REACTIONS WITH ALDEHYDES, AMINES, AMIDES, ALCOHOLS AND GLYCOLS, AZO-COMPOUNDS, CARBAMATES, ESTERS, CAUSTICS, PHENOLS AND CRESOLS, KETONES, ORGANOPHOSPHATES, EPOXIDES, EXPLOSIVES, COMBUSTIBLE MATERIALS, UNSATURATED HALIDES, AND ORGANIC PEROXIDES. PHOSPHORIC ACID FORMS FLAMMABLE GASES WITH SULFIDES, MERCAPTANS, CYANIDES AND ALDEHYDES. IT ALSO FORMS TOXIC FUMES WITH CYANIDES, SULFIDE, FLUORIDES, ORGANIC PEROXIDES, AND HALOGENATED ORGANICS. MIXTURES WITH NITROMETHANE ARE EXPLOSIVE.

CONDITIONS TO AVOID:
INCOMPATIBLES.

11. TOXICOLOGICAL INFORMATION

ORAL RAT LD50: 1530 MG/KG; INVESTIGATED AS A MUTAGEN

----/CANCER LISTS/----

---NTP CARCINOGEN--- INGREDIENT	KNOWN	ANTICIPATED	IARC CATEGORY
PHOSPHORIC ACID (7664-38-2)	NO	NO	NONE
WATER (7732-18-5)	NO	NO	NONE

==========

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE:
WHEN RELEASED INTO THE SOIL, THIS MATERIAL MAY LEACH INTO GROUNDWATER. WHEN RELEASED TO WATER, ACIDITY MAY BE READILY REDUCED BY NATURAL WATER HARDNESS MINERALS. THE PHOSPHATE, HOWEVER, MAY PERSIST INDEFINITELY.

ENVIRONMENTAL TOXICITY:
NO INFORMATION FOUND.

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13. DISPOSAL CONSIDERATIONS

WHATEVER CANNOT BE SAVED FOR RECOVERY OR RECYCLING SHOULD BE HANDLED AS HAZARDOUS WASTE AND SENT TO A RCRA APPROVED INCINERATOR OR DISPOSED IN A RCRA APPROVED WASTE FACILITY. PROCESSING, USE OR CONTAMINATION OF THIS PRODUCT MAY CHANGE THE WASTE MANAGEMENT OPTIONS. STATE AND LOCAL DISPOSAL REGULATIONS MAY DIFFER FROM FEDERAL DISPOSAL REGULATIONS.

DISPOSE OF CONTAINER AND UNUSED CONTENTS IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REQUIREMENTS.

==========

14. TRANSPORT INFORMATION

DOMESTIC (LAND, D.O.T.)

PROPER SHIPPING NAME: PHOSPHORIC ACID
HAZARD CLASS: 8
UN/NA: UN1805 PACKING GROUP: III
INFORMATION REPORTED FOR PRODUCT/SIZE: 355LB

INTERNATIONAL (WATER, I.M.O.)

PROPER SHIPPING NAME: PHOSPHORIC ACID, LIQUID
HAZARD CLASS: 8
UN/NA: UN1805 PACKING GROUP: III
INFORMATION REPORTED FOR PRODUCT/SIZE: 355LB

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15. REGULATORY INFORMATION

/CHEMICAL INVENTORY STATUS - PART 1/

INGREDIENT	TSCA	EC	JAPAN	AUSTRALIA
PHOSPHORIC ACID (7664-38-2)	YES	YES	YES	YES
WATER (7732-18-5)	YES	YES	YES	YES

--------/CHEMICAL INVENTORY STATUS - PART 2/----------

INGREDIENT	--CANADA--	KOREA	DSL	NDSL	PHIL.
PHOSPHORIC ACID (7664-38-2)		YES	YES	NO	YES
WATER (7732-18-5)		YES	YES	NO	YES

--------/FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 1/----------

INGREDIENT	-SARA 302-	------SARA 313----- RQ	TPQ	LIST	CHEMICAL CATG
PHOSPHORIC ACID (7664-38-2)		NO	NO	NO	NO
WATER (7732-18-5)		NO	NO	NO	NO

--------/FEDERAL, STATE & INTERNATIONAL REGULATIONS - PART 2/----------

INGREDIENT	-RCRA-	-TSCA- CERCLA	261.33	8(D)
PHOSPHORIC ACID (7664-38-2)		5000	NO	NO
WATER (7732-18-5)		NO	NO	NO

CHEMICAL WEAPONS CONVENTION: NO TSCA 12(B): NO CDTA: NO
SARA 311/312: ACUTE: YES CHRONIC: NO FIRE: NO PRESSURE: NO
REACTIVITY: NO (PURE / LIQUID)

AUSTRALIAN HAZCHEM CODE: 2R
POISON SCHEDULE: S5

NHMIS: THIS MSDS HAS BEEN PREPARED ACCORDING TO THE HAZARD CRITERIA OF THE CONTROLLED PRODUCTS REGULATIONS (CPR) AND THE MSDS CONTAINS ALL OF THE INFORMATION REQUIRED BY THE CPR.

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16. OTHER INFORMATION

NFPA RATINGS:
HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 0

For Additional Information:
Contact: MSDS Coordinator - Vopak USA
During business hours, Pacific Time - (425) 889-3400

NOTICE
Vopak USA, expressly disclaims all express or implied warranties of merchantibility and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from you. local Vopak USA Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Vopak USA makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Vopak USA's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process.

END OF MSDS

Olin
CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 15

OCEAN NETWORK EMERGENCY PHONE 1-888-2891-911

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THIS PRODUCT MAY BE CONSIDERED TO BE A HAZARDOUS CHEMICAL UNDER THAT STANDARD. (REFER TO THE OSHA CLASSIFICATION IN SEC.I.) THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE. THE EXPOSURE TO THE COMMUNITY, IF ANY, IS QUITE DIFFERENT.

I - Product Identification

Product Code:	105528 (Formerly CPE1670)
File No.:	MSDS1C05 (Formerly CPE00054.00C1)
Product Name:	POTASSIUM HYDROXIDE, 45% -50%
Synonyms:	Caustic Potash
Chemical Family:	Alkali, base
Formula:	KOH
Use Description:	Potassium source, pH adjustment, neutralizing agent
Hazard Classification:	Irritant; Corrosive; eye and skin hazard; lung toxin

II - Component Data

This Product Composition information presented here describes the major components and their concentrations found in this product and other information as required by OSHA. This is not, and should not be interpreted, or used as, a Product Specification or a detailed chemical analysis.

Established Federal OSHA PEL is provided. OSHA Agreement State PEL may be different.

Product Composition

CAS or Chemical Name:	Potassium hydroxide		
CAS Number:	1310-58-3		
Percentage Range:	45-53		
Hazardous Per 29 CFR 1910.1200:	Yes		
Exposure Standards:		OSHA(PEL) mg/M3	ACGIH(TLV) mg/M3
	TWA:	None	None
	CEILING:	None	2.0
	STEL:	None	None

AS or Chemical Name:	Water
CAS Number:	7732-18-5
Percentage Range:	47-55
Hazardous Per 29 CFR 1910.1200:	No
Exposure Standards:	None Established

Olin
CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 16

III - Precautions for Safe Handling and Storage

DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER FOR 15 MINUTES. AVOID BREATHING MIST OR VAPOR.

STORAGE CONDITIONS:

DO NOT STORE AT TEMPERATURES ABOVE: 54 Deg.C (130 Deg F)

PRODUCT STABILITY AND COMPATIBILITY:

SHELF LIFE LIMITATIONS:	None if tightly sealed.
INCOMPATIBLE MATERIALS FOR PACKAGING:	Aluminum, zinc, tin, wood, paper, glass
INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT:	Acids, nitrogen containing organics, phosphorus, explosives, organic peroxides, halogen compounds, aluminum, zinc, tin

IV - Physical Data

Appearance:	Colorless to slight yellow clear to cloudy liquid
Freezing Point:	45%: -33 Deg.C (-27 Deg.F) 50%: 2 Deg.C (36 Deg. F)
Boiling Point:	45%: 133 Deg.C (271 Deg.F) 50%: 143 Deg.C (289 Deg.F)
Decomposition Temperature:	No Data
Specific Gravity:	45%: 1.447 at 20 Deg.C (68 Deg.F) 50%: 1.505 at 20 Deg.C (68 Deg.F)
Bulk Density:	Not Applicable
pH @ 25° C:	> 13 (0.5% Solution)
Vapor Pressure @ 25° C:	45%: 6.4 mmHg 50%: 4 mmHg
Solubility in Water:	Miscible
Volatiles, Percent by Volume:	47-55
Evaporation Rate:	No Data
Vapor Density:	1
Molecular Weight:	56.1 (Active ingredient)
Odor:	None
Coefficient of Oil/Water Distribution:	No Data

V - Personal Protective Equipment Requirements

Personal Protection for Routine Use of Product:

Respiratory Protection:	Respirator protection not normally needed since the volatility and toxicity are low. If vapors, mists, or aerosols are generated, wear a NIOSH approved respirator.

Olin CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
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Ventilation:	Local exhaust ventilation is recommended if vapors, mists or aerosols are generated. Otherwise, use general exhaust ventilation.
Skin and Eye Protection:	Wear gloves, boots, apron and a face shield with safety goggles. A full impermeable suit is recommended if exposure is possible to large portion of body.
Other:	Emergency eye wash and safety showers must be provided in the immediate work area.

Equipment Specifications (When Applicable):

Respirator Type:	NIOSH approved HEPA filter respirator
Protective Clothing Type: (This includes: gloves, boots, apron, protective suit.)	All types including glove, boot, apron and protective suit: Neoprene, NBR, PVC, Natural Rubber

VI - Fire and Explosion Hazard Information

Flammability Data:

Explosive:	N/A
Flammable:	No
Combustible:	No
Pyrophoric:	No
Flash Point:	Not Applicable
Autoignition Temperature:	Not Applicable
Flammable Limits at Normal Atmospheric Temperature and Pressure (Percent Volume in Air):	LEL - Not Applicable UEL - Not Applicable

NFPA Ratings:

Health:	3
Flammability:	0
Reactivity:	1

HMIS Ratings:

Health:	3
Flammability:	0
Reactivity:	1

Extinguishing Media:

Not Applicable. Choose extinguishing media suitable for surrounding materials.

Fire Fighting Techniques and Comments:

Use water to cool containers exposed to fire. Use flooding quantities of water. Potassium hydroxide may react with water (see Section VII). Contact with reactive metals, e.g., aluminum may result in the generation of flammable hydrogen gas. See Section XI for protective equipment for fire fighting. On small fires, use dry chemical, carbon dioxide, water spray, or foam. On large fires, use water-flooding quantities as a fog.

Olin CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 16

VII - Reactivity Information

Conditions under Which This Product May Be Unstable:

Temperatures Above:	Decomposition temperature
Mechanical Shock or Impact:	No
Electrical (Static) Discharge:	No
Other:	None
Hazardous Polymerization:	Will not occur
Incompatible Materials:	Acids, nitrogen containing organics, chlorinated alkenes, carbohydrates, phosphorous, explosives, organic peroxides, per sulfates, aluminum, tin, or zinc
Hazardous Decomposition:	Carbon monoxide with carbohydrates, hydrogen with aluminum, zinc or tin; K2O from decomposition by heat, Chloroacetylene with chlorinated alkenes and heat.

Summary of Reactivity:

Explosive:	No
Oxidizer:	No
Pyrophoric:	No
Organic Peroxide:	No
Water Reactive:	No (See caution below)
Corrosive:	Yes

Caution: heat is liberated when potassium hydroxide and water are mixed which can result in splattering or dangerous mists.

VIII - First Aid

Eyes

Immediately Flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Seek medical attention at once.

Skin

Immediately flush with water for 15 minutes. Wash the contaminated skin with soap and water. If irritation develops, seek medical attention. If clothing, shoes and/or jewelry come in contact with the product, they should be laundered before re-use.

Ingestion

Immediately drink large quantities of water. DO NOT induce vomiting. Seek medical attention at once. DO NOT give anything by mouth if the person is unconscious or if having convulsions.

Olin CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 15

Inhalation

If person experiences nausea, headache or dizziness, person should stop work immediately and move to fresh air until these symptoms disappear. If breathing is difficult, administer oxygen, keep the person warm and at rest. Seek medical attention. In the event that an individual inhales enough vapor to lose consciousness, person should be moved to fresh air at once immediately seek medical attention. If breathing has stopped, artificial respiration should be given immediately. In all cases, ensure adequate ventilation and provide respiratory protection before the person returns to work.

IX - Toxicology and Health Information

Routes of Absorption

Dermal and eye contact, inhalation, ingestion

Warning Statements and Warning Properties

May be harmful if swallowed. Causes skin and eye burns. May cause respiratory tract irritation.

Human Threshold Response Data

Odor Threshold:	No Data
Irritation Threshold:	No Data
Immediately Dangerous to Life or Health:	None established.

Signs, Symptoms and Effects of Exposure

Inhalation

Acute:	Inhalation of this material is irritating to the nose, mouth, throat and lungs. It may also cause burns to the respiratory tract, which can result in shortness of breath, wheezing, choking, chest pain and impairment of lung function. Inhalation of high concentration can result in permanent lung damage.
Chronic:	Chronic (repeated) inhalation exposure may cause impairment of lung function and permanent lung damage.

Skin

Acute:	Dermal exposure can cause severe irritation and/or burns characterized by redness, swelling and scab formation. Prolonged skin exposure may cause permanent damage.
Chronic:	Effects from chronic skin exposure would be similar to those from single exposure and may include effects secondary to tissue destruction.

Eye

Severe irritation and/or burns can occur following eye exposure. Contact may cause impairment of vision and corneal damage.

Olin CHLOR ALKALI PRODUCTS

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Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 15

Ingestion

Acute:	Irritation and/or burns can occur to the entire gastrointestinal tract, including the stomach and intestines, characterized by nausea, vomiting, diarrhea, abdominal pain, bleeding and/or tissue ulceration. Ingestion causes severe damage to the gastrointestinal tract with the potential to cause perforation.
Chronic:	Effects from chronic exposure would be similar to those from single exposure and may include effects secondary to tissue destruction.

Medical Conditions Aggravated by Exposure

Asthma, respiratory and cardiovascular disease

Interactions with Other Chemicals Which Enhance Toxicity

There are no chemicals know to enhance the toxicity of the product.

Animal Toxicology

Acute Target Organ Toxicity

Inhalation LC 50: No Data
Dermal LD 50: Believed to be > 2 g/kg. (Rabbit)
Oral LD 50: Believed to be 500-700 mg/kg. (Rat)
Irritation: Causes burns to eyes and skin

Chronic Target Organ Toxicity

There are no known or reported effects from repeated exposure.

Reproductive and Developmental Toxicity

There are no known or reported effects on reproductive function or fetal development.

Carcinogenicity

This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA

Mutagenicity

This product is not know or reported to be mutagenic.

Aquatic Toxicity

Aquatic Toxicity Rating 2 (TLM96:100-10 ppm)
TLM96 - Gambusia Affinis (Mosquito-Fish) 80 ppm
Lethal Dose (24 hr. exposure):
Trout - 50 ppm
Bluegills - 56 ppm
Lepomis Pallidus (minnows) - 28 ppm

Olin CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 16

X - TRANSPORTATION INFORMATION

THIS MATERIAL IS REGULATED AS DOT HAZARDOUS MATERIAL.

DOT Description from the Hazardous Materials Table 49 CFR 172.101:

Land (U.S. DOT):	Potassium hydroxide solution, 8, UN1814, PG II
Water (IMO):	Same as above
Air (IATA/ICAO):	Same as above
Hazard Label/Placard:	CORROSIVE
Reportable Quantity:	1,000 lbs. (Per 49 CFR 172.101, Appendix)
Emergency Guide:	154

XI - SPILL AND LEAKAGE PROCEDURES

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.

Reportable Quantity:	1000 LBS. (Per CFR 302.4)

Spill Mitigation Procedures:

Hazardous concentrations in air may be found in local spill area and immediately downwind. This product may represent an explosion hazard if in contact with some metals. Remove all sources of ignition.

Air Release:	Vapors may be suppressed by the use of a water fog. Contain all run-off water for treatment and/or proper disposal.
Water Release:	This material is heavier than water. This material is soluble in water. Stop source of spill if safe to do so, divert all flow and contain in a dike or trench. Remove and containerize or neutralize in place, then remove for proper disposal.
Land Spill:	This material may cause ground water contamination. Collectively dike and contain all material as necessary. Begin a neutralization and/or containerization process as soon as possible. Rinse spill area with water after clean up is complete and containerize rinse water and/or neutralize as necessary.

Spill Residues:

Dispose of per guidelines under Section XII, WASTE DISPOSAL.

This material may be neutralized for disposal; you are requested to contact OCEAN at 888-289-1911 before beginning any such operation.

Personal Protection for Emergency Spill and Firefighting Situations:

Response to this material requires the use of a full-encapsulated suit and self-contained breathing apparatus (SCBA).

Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to: boots, gloves, hard hat, splash-proof goggles and impervious clothing, i.e., chemically impermeable suit.

Compatible materials for response to this material are neoprene, polyvinyl chloride, butyl rubber and natural rubber.

Olin
CHLOR ALKALI PRODUCTS

MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 15

XII - Waste Disposal

If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following EPA hazardous waste number: D002.

If this product becomes a waste, it will be a hazardous waste, which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.

As a hazardous liquid waste, it must be disposed of in accordance with local, state and federal regulations in a permitted hazardous waste treatment, storage and disposal facility by treatment.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USE OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OFUNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

XIII - Additional Regulatory Status Information

TOXIC SUBSTANCES CONTROL ACT:
This substance is listed on the Toxic Substances Control Act inventory.

NSF LIMITS: NSF Maximum Drinking Water Use Concentration - 100 mg/l (dry basis).

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW, PER 40 CFR 355, APP. A:
EXTREMELY HAZARDOUS SUBSTANCE - THRESHOLD PLANNING QUANTITY:
None Established
SUPPLIER NOTIFICATION REQUIREMENTS, PER 40 CFR 372.45:
None Established

XIV - Additional Information

MSDS REVISION STATUS: Changes from Rev14 (27/97) have been made to Sections I - Product Identification, II - Component Data, IV - Physical Data, VI - Fire and Explosion Hazard Information, VII - Reactivity Information, XIII - Additional Regulatory Status Information, XV - Major References. Revised Section XIII January 2006.

XV - Major References

References are available upon request.

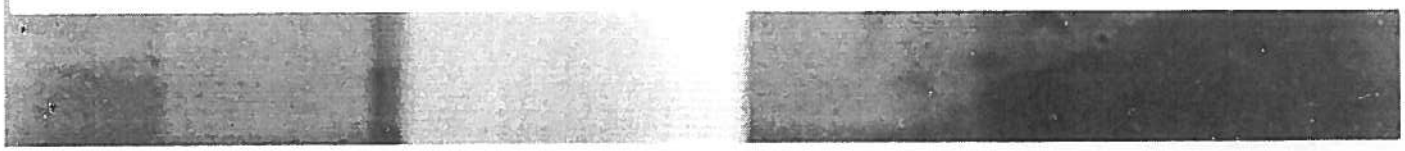
Olin
CHLOR ALKALI
PRODUCTS

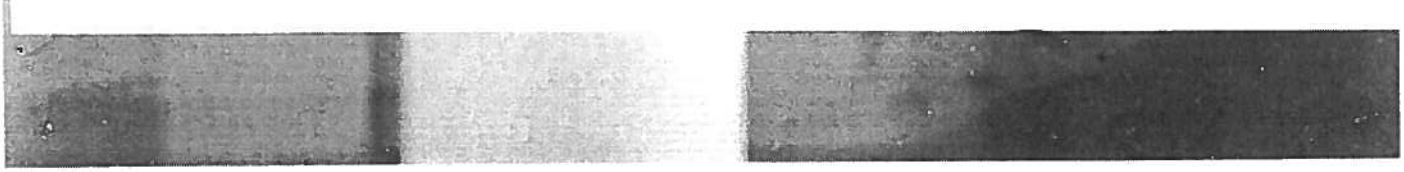
MATERIAL SAFETY DATA

Product Name: Potassium Hydroxide, 45 - 50%
Revision Date: 01/27/06 Revision No.: 15

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

ORC MSDS CONTROL GROUP
Olin Chlor Alkali
1186 Lower River Road
P.O. Box 248
Charleston, TN 37310
Phone Number: (888)-658-MSDS (6737)





T D C

Material Safety Data Sheet

Sodium hydrosulfide solution

MSDS Number 8000TDC (Revised: 6/19/02) 6 Pages

Section 1: CHEMICAL PRODUCT and COMPANY IDENTIFICATION

1.1 **Product Name** ..... **Sodium hydrosulfide solution**
Chemical Family ..... Inorganic salt solution
Synonyms ..... KI-300 depressant, NaHS, sodium hydrogen sulfide
Formula ..... NaHS

1.2 **Manufacturer** ..... Tessenderlo Davison Chemicals
1916 Farmerville Highway
Ruston, Louisiana 71270
Information ..... (318) 242-5305

1.3 **Emergency Contact** ..... (800) 877-1737 (Tessenderlo Kerley)
(800) 424-9300 (CHEMTREC)

Section 2: COMPOSITION, INFORMATION ON INGREDIENTS

2.1 **Chemical Ingredients (% by wt.)**

Sodium hydrosulfide	CAS #:16721-80-5	20-45%
Water	CAS #:7732-18-5	55-80%

(See Section 8 for exposure guidelines)

Section 3: HAZARDS IDENTIFICATION

NFPA: Health - 3 Flammability - 2 Reactivity - 1

EMERGENCY OVERVIEW

Warning: Solution is highly alkaline
Contains hydrogen sulfide , a highly toxic gas.
Eye contact will cause marked eye irritation and possibly severe corneal damage.
Skin contact will result in irritation and possible corrosion of the skin.
Ingestion will irritate/burn mouth, throat and gastrointestinal tract. Contact with stomach acid will cause hydrogen sulfide vapors to be released.
Heating or acid will cause hydrogen sulfide gas to evolve.

3.1 POTENTIAL HEALTH EFFECTS

EYE: Contact with the eyes will cause marked eye irritation and possibly severe corneal damage.

Section 3: HAZARDS IDENTIFICATION, Cont.

SKIN CONTACT: Contact with the skin will cause skin irritation or burning sensation. Prolonged contact will result in corrosion of the skin.

SKIN ABSORPTION: Absorption is unlikely to occur.

INGESTION: Ingestion will result in severe burning and corrosion of mouth, throat and the gastrointestinal tract. If the ingested material contacts stomach acid, highly toxic hydrogen sulfide gas will be evolved.

INHALATION: Product solution and vapors contain highly toxic hydrogen sulfide gas. Exposure to this gas causes, headaches, nausea, dizziness and vomiting. Continued exposure can lead to loss of consciousness and death..

CHRONIC EFFECTS/CARCINOGENICITY: Not listed as a carcinogen by NTP, IARC or OSHA.

Section 4: FIRST AID MEASURES

4.1 EYES: Immediately flush with large quantities of water for 15 minutes. Hold eyelids apart during irrigation to insure thorough flushing of the entire area of the eye. Obtain immediate medical attention.

4.2 SKIN: Immediately flush with large quantities of water. Remove contaminated clothing under a safety shower. Obtain immediate medical attention

4.3 INGESTION: DO NOT INDUCE VOMITING. If victim is conscious, immediately give 2 to 4 glasses of water. If vomiting does occur, repeat fluid administration. Obtain immediate medical attention.

4.4 INHALATION: Remove victim from contaminated atmosphere. If breathing is labored, administer oxygen. If breathing has ceased, clear airway and start mouth to mouth resuscitation. If heart has stopped beating, external heart massage should be applied. Obtain immediate medical attention.

Section 5: FIRE FIGHTING MEASURES

5.1 FLAMMABLE PROPERTIES

FLASH POINT: Not flammable **METHOD USED:** NA

5.2 FLAMMABLE LIMITS **Hydrogen sulfide** **LFL:** 4% **UFL:** 44%

5.3 EXTINGUISHING MEDIA: Water spray or foam or as appropriate for combustibles involved in fire.

5.4 FIRE & EXPLOSIVE HAZARDS: Solution is non-flammable. However if these solutions are exposed to heat or acids, hydrogen sulfide will be released and may form explosive mixtures with air (see above).

Keep containers/storage vessels in fire area cooled with water spray. Heating may cause the release of hydrogen sulfide vapors.

Section 5: FIRE FIGHTING MEASURES (Cont.)

5.5 FIRE FIGHTING EQUIPMENT: Because of the possible presence of toxic gases and the corrosive nature of the product, wear self-contained breathing apparatus, pressure demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Section 6: ACCIDENTAL RELEASE MEASURES

6.1 Small releases: Confine and absorb small releases on sand earth or other inert absorbent. Oxidize residual reactive sulfides with a weak (3-5%) hydrogen peroxide solution.

6.2 Large releases: Wear proper protective equipment. Confine area to qualified personnel. Shut off release if safe to do so. Dike spill area to prevent runoff into sewers, drains (potential explosive mixtures of hydrogen sulfide in confined spaces) or surface waterways (potential aquatic toxicity). Recover as much of the solution as possible. Treat remaining material as a small release (above).

Section 7: HANDLING and STORAGE

7.1 Handling: Wear proper protective equipment (See Section 8). Avoid breathing product vapors. Avoid contact with skin and eyes. Use only in a well ventilated area. Dilute product only in enclosed containers. Wash thoroughly after handling.

7.2 Storage: Store in well ventilated areas. Do not store combustibles in the area of storage vessels. Keep away from any sources of heat or flame. Store tote and smaller containers out of direct sunlight at moderate temperatures [<80° F (27° C)]. (See Section 10.4 for materials of construction)

Section 8: EXPOSURE CONTROLS, PERSONAL PROTECTION

8.1 RESPIRATORY PROTECTION: If working near open container or storage vessel opening or open tank truck dome cover, wear self-contained breathing apparatus, pressure demand, MSHA/NIOSH (approved or equivalent).

8.2 SKIN PROTECTION: Neoprene rubber gloves, chemical suit and boots should be worn to prevent contact with the liquid. Wash contaminated clothing prior to reuse. Contaminated leather shoes cannot be cleaned and should be discarded.

8.3 EYE PROTECTION: Chemical goggles and a full face shield.

8.4 EXPOSURE GUIDELINES:

	OSHA		ACGIH	
	TWA	STEL	TLV	STEL
Hydrogen sulfide	20 ppm (ceiling)		10 ppm (ceiling)	

8.5 ENGINEERING CONTROLS: Use adequate exhaust ventilation to prevent inhalation of product vapors. Where feasible scrub process or storage vessel vapors with caustic solution.
Maintain eyewash/safety shower in areas where chemical is handled.

Section 9: PHYSICAL and CHEMICAL PROPERTIES

9.1 APPEARANCE:	Yellow to dark green liquid.
9.2 ODOR:	Strong hydrogen sulfide (rotten egg) odor.
9.3 BOILING POINT:	253 °F(122.8 °C) - 269 °F (131.7 °C)
9.4 VAPOR PRESSURE:	17 mm Hg @ 68 °F (20 °C)
9.5 VAPOR DENSITY: (Air = 1.0)	1.17
9.6 SOLUBILITY IN WATER:	Complete
9.7 SPECIFIC GRAVITY:	1.152 - 1.303 (9.6 - 10.9 lbs/gal)
9.8 FREEZING POINT:	0° F (-17.8° C) - 20% 56° F (13.3° C) - 45%
9.9 pH:	11.5 - 12.5
9.10 VOLATILE:	Not applicable

Section 10: STABILITY and REACTIVITY

10.1 STABILITY: This is a stable material

10.2 HAZARDOUS POLYMERIZATION: Will not occur.

10.3 HAZARDOUS DECOMPOSITION PRODUCTS: Heating this product will evolve hydrogen sulfide. Fire conditions will also cause the production of sulfur dioxide. Hydrogen sulfide (4-44%) may form flammable mixtures with air.

10.4 INCOMPATIBILITY: Acids will cause the release of highly toxic hydrogen sulfide. Sodium hydrosulfide solution is not compatible with copper, zinc, aluminum or their alloys (i.e. bronze, brass, galvanized metals, etc.). Corrosive to steel above 150° F (65.5° C). These materials of construction should not be used in handling systems or storage containers for this product. (SEE Section 7.2, Storage)

Section 11: TOXICOLOGICAL INFORMATION

11.1 ORAL: Data not available

11.2 DERMAL: Data not available

11.3 INHALATION: INH-RAT LC_{50}: 444 ppm (hydrogen sulfide)
INH-MOUSE LC_{50}: 1,500 mg/m^3 18 minutes
INH-RAT LC_{50}: 1,500 mg/m^3 14 minutes

11.4 CHRONIC/CARCINOGENICITY: No evidence available

11.5 TERATOLOGY: Data not available

11.6 REPRODUCTION: Data not available

11.7 MUTAGENICITY: Data not available

Section 12: ECOLOGICAL INFORMATION

Static acute 96 hour-LC_{50} for mosquito fish is 206 mg/L. (TI_m - fresh water)
LC_{50} fly inhalation 1,500 mg/m^3, 7 minutes
TL_m Gammarus 0.84 mg/L, 96 hours (hydrogen sulfide)
TL_m Ephemera 0.316 mg/L, 96 hours (hydrogen sulfide)
TL_m Flathead minnow 0.071 – 0.55 mg/L @ 6-24°C, 96 hour flow through bioassay (hydrogen sulfide)
TL_m Bluegill 0.0090 – 0.0140 mg/L @ 20-22°C, 96 hour flow through bioassay (hydrogen sulfide)
TL_m Brook trout 0.0216 – 0.0308 mg/L @ 8-12.5°C, 96 hour flow through bioassay (hydrogen sulfide)

Section 13: DISPOSAL CONSIDERATIONS

If released to the environment for other than its intended purpose, this product contains some reactive sulfides which may be in sufficient quantity to meet the definition of a D003, hazardous waste.

Section 14: TRANSPORT INFORMATION

14.1 DOT Shipping Name:	Sodium hydrosulfide, solution (Domestic only) Corrosive liquids, toxic, n.o.s. (International)
14.2 DOT Hazard Class:	8
14.3 UN/NA Number:	NA2922 (Domestic) UN2922 (International) UN2949 (IMDG - over water)
14.4 Packing Group:	II
14.5 DOT Placard:	Corrosive
14.6 DOT Label(s):	Corrosive Toxic
14.7 IMO Shipping Name:	Sodium hydrosulphide solution
14.8 RQ (Reportable Quantity):	5,000 lbs (2268 Kg) 100% basis
14.9 RR STCC Number:	28-123-33/49-352-04 (international)

Section 15: REGULATORY INFORMATION

15.1 OSHA:		This product is listed as a hazardous material under criteria of the Federal OSHA Hazard Communication Standard, 29 CFR 1910.1200.	
15.2 SARA TITLE III:	a.	**EHS** (Extremely Hazardous Substance) List:	No

Section 15: REGULATORY INFORMATION (Cont.)

b.	Section 311/312, (Tier I,II) Categories:	Immediate (acute)	Yes
		Fire	Yes
		Sudden release	No
		Reactivity	Yes
		Delayed (chronic)	No
c.	Section 313 (Toxic Release Report-Form R):		No
d.	**TPQ** (Threshold Planning Quantity):		No

15.3 CERCLA/SUPERFUND: RQ (Reportable Quantity) — 5,000 lbs (2270 Kg)

15.4 TSCA (Toxic Substance Control Act) Inventory List: — Yes

15.5 RCRA (Resource Conservation and Recovery Act) Status: — D003 (See Section 13)

15.6 WHMIS (Canada) Hazard Classification: — E, D1

15.7 DOT Hazardous Material: (See Section 14) — Yes

15.8 CAA Hazardous Air Pollutant (HAP) — No

Section 16: OTHER INFORMATION

REVISIONS: The entire MSDS was reformatted to comply to ANSI Standard Z400.1-1993.

Revised Sections 1.1, 8.3, 11, 12, 5/7/02
Revised pH range in Section 8, 6/19/02

DATE: 08/05/08 ACCT: 294966003
INDEX: H82178267 CAT NO: S6254500 PO NBR: 9500973379

Material Safety Data Sheet

Sodium Hydroxide Solutions, 40 to 50%
MSDS# 40174

Section 1 - Chemical Product and Company Identification

MSDS Name:
Sodium Hydroxide Solutions, 40 to 50%
Catalog Numbers:
GENS52544, RP25443F, SS254-1, SS254-1LC, SS254-20, SS254-200, SS254-4, SS254-50C, SS410-20, SS410-4, SS411-10, SS411-4
Synonyms:
Caustic soda; Lye.
Company Identification:
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
For information in the US, call:
201 796-7100
Emergency Number US:201-796-7100
CHEMTREC Phone Number, US:
800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#: 1310-73-2
Chemical Name: Sodium hydroxide
%: 40-50
EINECS#: 215-185-5
Hazard Symbols: C
Risk Phrases: 35

CAS#: 7732-18-5
Chemical Name: Water
%: 50-60
EINECS#: 231-791-2
Hazard Symbols:
Risk Phrases:

Text for R phrases: see Section 16
Hazard Symbols:
C
Risk Phrases:
35

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! Corrosive. Causes burns by all exposure routes.
Target Organs: Eyes, skin, mucous membranes.
Potential Health Effects
Eye:
Causes eye burns. May cause chemical conjunctivitis and corneal damage.
Skin:
Causes skin burns. May cause deep, penetrating ulcers of the skin. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion:
May cause severe and permanent damage to the digestive tract. Causes gastrointestinal tract burns. May cause perforation of the digestive tract. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause systemic effects.
Inhalation:
Irritation may lead to chemical pneumonitis and pulmonary edema. Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma. Causes chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. May cause systemic effects.
Chronic:
Prolonged or repeated skin contact may cause dermatitis. Effects may be delayed.

Section 4 - First Aid Measures

Eyes:
In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid immediately.
Skin:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.
Ingestion:
If swallowed, do NOT induce vomiting. Get medical aid immediately. If victim is fully conscious, give a cupful of water. Never give anything by mouth to an unconscious person.
Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician:
Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full

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protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Contact with metals may evolve flammable hydrogen gas. Containers may explode when heated. Non-combustible, substance itself does not burn but may decompose upon heating to produce irritating, corrosive and/or toxic fumes.
Extinguishing Media:
Do NOT get water inside containers. For small fires, use dry chemical, carbon dioxide, or water spray. For large fires, use dry chemical, carbon dioxide, alcohol-resistant foam, or water spray. Cool containers with flooding quantities of water until well after fire is out.
Autoignition Temperature:Not applicable.
Flash Point:Not applicable.
Explosion Limits, Lower:Not available
Explosion Limits, Upper:Not available
NFPA Rating:
Health: 3; Flammability: 0; Instability: 1;

Section 6 - Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks:
Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling:
Wash thoroughly after handling. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Discard contaminated shoes. Use only with adequate ventilation. Do not breathe spray or mist.
Storage:
Keep container closed when not in use. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from strong acids. Keep away from metals. Keep away from flammable liquids. Keep away from organic halogens.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium hydroxide	2 mg/m3 Ceiling	10 mg/m3 IDLH	2 mg/m3 TWA
Water	none listed	none listed	none listed

OSHA Vacated PELs:
Sodium hydroxide:
None listed
Water:
None listed
Personal Protective Equipment
Eyes:
Wear chemical splash goggles.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Color: Clear
Odor: none reported
pH: Alkaline
Vapor Pressure: 3 mm Hg @ 37 deg C
Vapor Density: >1.0
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: 141.7 deg C (287.06&F)
Freezing/Melting Point: 5 - 10.6 deg C
Decomposition Temperature: Not available
Solubility in water: Soluble
Specific Gravity/Density: 1.530 @15.6&C
Molecular Formula: Solution
Molecular Weight: 0

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Section 10 - Stability and Reactivity

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid:
Extreme temperatures.
Incompatibilities with Other Materials
Metals, acids, aluminum, nitro compounds, zinc, tin, halogenated hydrocarbons, nitromethane, flammable liquids.
Hazardous Decomposition Products
Toxic fumes of sodium oxide.
Hazardous Polymerization
Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 1310-73-2: WB4900000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
RTECS: CAS# 1310-73-2: Draize test, rabbit, eye: 400 ug Mild; Draize test, rabbit, eye: 1% Severe; Draize test, rabbit, eye: 50 ug/24H Severe; Draize test, rabbit, eye: 1 mg/24H Severe; Draize test, rabbit, skin: 500 mg/24H Severe;.
RTECS: CAS# 7732-18-5: Oral, rat: LD50 = >90 mL/kg;.
Carcinogenicity:
Sodium hydroxide -
Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Water -
Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
Epidemiology:
No information found
Teratogenicity:
No information found
Reproductive:
No information found
Neurotoxicity:
No information found
Mutagenicity:
No information found
Other:
See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

US DOT
Shipping Name: SODIUM HYDROXIDE SOLUTION
Hazard Class: 8
UN Number: UN1824
Packing Group: II
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:
USA RQ: CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

Section 15 - Regulatory Information

US Federal
TSCA
CAS# 1310-73-2 is listed on the TSCA Inventory.
CAS# 7732-18-5 is listed on the TSCA Inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 1310-73-2: acute, reactive.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.

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This material does not contain any Class 2 Ozone depletors
Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
STATE
Sodium hydroxide can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
Water is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California Prop 65
California No Significant Risk Level:
None of the chemicals in this product are listed.
European/International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 35 Causes severe burns.
Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
WGK (Water Danger/Protection)
CAS# 1310-73-2: 1
CAS# 7732-18-5: Not available
Canada
CAS# 1310-73-2 is listed on Canada's DSL List
CAS# 7732-18-5 is listed on Canada's DSL List
Canadian WHMIS Classifications: E
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
CAS# 1310-73-2 is listed on Canada's Ingredient Disclosure List
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date:
1/27/1999
Revision #11 Date
11/13/2007
Revisions were made in Sections:
9
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages

MSDS Number: **S4760** * * * * * *Effective Date: **02/15/08** * * * * * Supercedes: **05/09/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone 908.859.2151
CHEMTREC 1-800-424-9300

National Response in Canada
CANUTEC 613.996.6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: [illegible]

SODIUM PHOSPHATE, DIBASIC, ANHYDROUS

1. Product Identification

Synonyms: Disodium phosphate; DSP; Disodium hydrogen phosphate
CAS No.: 7558-79-4
Molecular Weight: 141.96
Chemical Formula: Na2HPO4
Product Codes:
J.T. Baker: 3804, 3807, 3826, 3827, 3828, 3829, 3830, 4062
Mallinckrodt: 7771, 7895, 7913, 7915, 7917, 7993

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Phosphate, Dibasic	7558-79-4	98 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE HARMFUL IF SWALLOWED OR INHALED.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate (Life)
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Green (General Storage)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.
Ingestion:
Phosphates are slowly and incompletely absorbed when ingested, and seldom result in systemic effects. Such effects, however, have occurred. Symptoms may include vomiting, lethargy, diarrhea, blood chemistry effects, heart disturbances and central nervous system effects. The toxicity of phosphates is because of their ability to sequester calcium.
Skin Contact:
May cause irritation with redness and pain.
Eye Contact:
May cause irritation, redness and pain.
Chronic Exposure:
May sequester calcium and cause calcium phosphate deposits in the kidneys. Chronic ingestion or inhalation may induce systemic phosphorous poisoning. Liver damage, kidney damage, jaw/tooth abnormalities, blood disorders and cardiovascular effects can result.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, jaw/tooth abnormalities, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal. Small amounts of residue may be flushed to sewer with plenty of water. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White granular powder. Hygroscopic.
Odor:
Odorless.
Solubility:
Soluble in water.
Specific Gravity:

2.07 @ 15C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
Not applicable.
Melting Point:
240C (464F) Converts to Na4P2O7
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Sodium and phosphorus oxides may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Acids, alkaloids, lead acetate, antipyrine, chloral hydrate, resorcinol and pyrogallol.
Conditions to Avoid:
Incompatibles.

11. Toxicological Information

Oral rat LD50: 17 gm/kg. Skin rabbit, standard Draize, 500 mg/24H, mild. Eye rabbit, standard Draize, 500 mg/24H mild.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Phosphate, Dibasic (7558-79-4)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sodium Phosphate, Dibasic (7558-79-4)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Phosphate, Dibasic (7558-79-4)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Phosphate, Dibasic (7558-79-4)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Phosphate, Dibasic (7558-79-4)	5000	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0**

Label Hazard Warning:

CAUTION! MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY BE HARMFUL IF SWALLOWED OR INHALED.

Label Precautions:

Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.

Label First Aid:

If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists. If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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****

Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Material Safety Data Sheet

Sulfuric Acid, >51%

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sulfuric Acid, >51%

OTHER/GENERIC NAMES: Battery acid, sulphuric acid, oil of vitriol, hydrogen sulfate, dihydrogen sulfate

PRODUCT USE: Industrial

MANUFACTURER/ SUPPLIER:
General Chemical, LLC
90 East Halsey Road
Parsippany, NJ 07054

General Chemical Performance Products Ltd.
277 Lakeshore Road, East, Suite #206
Oakville, Ontario L6J 1H9

FOR MORE INFORMATION CALL:
US ONLY
(Monday-Friday, 9:00am-4:30pm)
800-631-8050
Customer Service

CANADA ONLY
(Monday-Friday, 9:00am-4:30pm)
866-543-3896
Customer Service

IN CASE OF EMERGENCY CALL:
US ONLY
(24 Hours/Day, 7 Days/Week)
800-424-9300
(CHEMTREC)

CANADA ONLY
(24 Hours/Day, 7 Days/Week)
613-996-6666
(CANUTEC)

2. COMPOSITION/INFORMATION ON HAZARDOUS INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Sulfuric acid	7664-93-9	>51

Trace impurities and additional material names not listed above may appear in Section 15 of this MSDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons.

OSHA Hazard Communication Standard: *This product is considered hazardous under the OSHA Hazard Communication Standard.*

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Oily, colorless to slightly yellow, clear to turbid liquid. Odorless. Causes severe skin burns. Causes severe eye burns. Causes burns of the mouth, throat, and stomach.

POTENTIAL HEALTH HAZARDS

SKIN: Causes severe burns.

EYES: Liquid contact can cause irritation, corneal burns, and conjunctivitis. May result in severe or permanent injury. May cause blindness.

INHALATION: Inhalation of fumes or acid mist can cause irritation or corrosive burns to the upper respiratory system, including the nose, mouth and throat. May irritate the lungs. May cause pulmonary edema.

INGESTION: Causes burns of the mouth, throat and stomach. May be fatal if swallowed. Hazards are also applicable to dilute solutions.

DELAYED EFFECTS: Erosion of teeth, lesions of the skin, tracheo-bronchitis, mouth inflammation, conjuctivitis and gastritis.IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen. This classification is for inorganic acid mists only and does not apply to sulfuric acid or sulfuric acid solutions. The basis for the classifications rests on several epidemiology studies which have several deficiencies. These studies did not account for exposure to other substances, some known to be animal or potential human carcinogens, social influences (smoking or alcohol consumption) and included small numbers of subjects. Based on the overall weight of evidence from all human and chronic animal studies, no definitive causal relationship between sulfuric acid mist exposure and respiratory tract cancer has been shown.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
Sulfuric acid	Known carcinogen – sulfuric acid mist	1-Known carcinogen – sulfuric acid mist	Not listed

4. FIRST AID MEASURES

SKIN: Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing while washing. Get medical attention immediately.

EYES: Immediately flush eyes with large amounts of water for at least 15 minutes. Get immediate medical attention.

INHALATION: If inhaled, remove to fresh air. If not breathing give artificial respiration, preferably mouth-to-mouth. If breathing is difficult give oxygen. Get medical attention.

INGESTION: If swallowed, do NOT induce vomiting. Give victim two glasses of water. Call a physician immediately. Never give anything by mouth to an unconscious person.

ADVICE TO PHYSICIAN: Treat symptomatically.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT:	Not applicable.
FLASH POINT METHOD:	Not applicable.
AUTOIGNITION TEMPERATURE:	Not applicable.
UPPER FLAME LIMIT (volume % in air):	Not applicable.
LOWER FLAME LIMIT (volume % in air):	Not applicable.
FLAME PROPAGATION RATE (solids):	Not applicable.
OSHA FLAMMABILITY CLASS:	Not flammable.

EXTINGUISHING MEDIA:
Water spray or fog may be used to knock down corrosive vapor cloud. Water may be applied to the sides of the containers exposed to flames provided the water does not come in contact with the tank contents.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Flammable and potentially explosive hydrogen gas can be generated inside metal drums and storage tanks. Concentrated sulfuric acid can ignite combustible materials on contact.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS:
Do not use solid water streams near ruptured tanks or spills of sulfuric acid. Acid reacts violently with water and can spatter acid onto personnel. Wear approved positive-pressure self-contained breathing apparatus and protective clothing.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (See section 8 for recommended personal protective equipment.)
Dilute small spills or leaks cautiously with plenty of water. Neutralize residue with sodium bicarbonate or other suitable neutralizing agent. When using carbonates for neutralization, adequate precautions should be taken to minimize hazards from carbon dioxide gas generation. No smoking in spill area. Major spills must be handled by a predetermined plan. Attempt to keep out of sewers.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

7. HANDLING AND STORAGE

NORMAL HANDLING: (See section 8 for recommended personal protective equipment.)
Avoid contact with skin, eyes and clothing. Avoid breathing mist. Use appropriate personnel protective equipment. Do not add water to acid. When diluting, always add acid to water cautiously and with agitation. Use with adequate ventilation.

STORAGE RECOMMENDATIONS:
Protect from physical damage. Store in a cool, well-ventilated area away from combustibles and reactive chemicals. Keep out of sun and away from heat. Keep containers upright. No smoking in storage area.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits. Sufficient to reduce vapor and acid mists to permissible levels. Packaging and unloading areas and open processing equipment may require mechanical exhaust systems. Corrosion-proof construction recommended. Closed ventilation systems (e.g. vapor hoods) are frequently used in the electronics industry.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:	Wear rubber gloves and protective clothing including boots, apron, or protective suit as appropriate to prevent skin exposure. Acid resistant boots, trousers and jacket may be used for increased protection.
EYE PROTECTION:	Wear appropriate safety glasses or chemical splash goggles and faceshield where contact due to splashing or spraying is possible.
RESPIRATORY PROTECTION:	A respiratory protection program that meets OSHA 1910.134 and ANSI Z88.2 or applicable federal/provincial requirements must be followed whenever workplace conditions warrant respirator use. NIOSH's "Respirator Decision Logic" may be useful in determining the suitability of various types of respirators.
ADDITIONAL RECOMMENDATIONS:	To identify additional Personal Protective Equipment (PPE) requirements, it is recommended that a hazard assessment in accordance with the OSHA PPE Standard (29CFR1910.132) be conducted before using this product.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Sulfuric acid	1 mg/m^3 – TWA 3 mg/m^3 – STEL	1 mg/m^3 – TWA	15 mg/m^3 - IDLH

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:
None.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Colorless to light yellow liquid
PHYSICAL STATE:	Liquid
MOLECULAR WEIGHT:	98.08 (H_2SO_4)
CHEMICAL FORMULA:	H_2SO_4 (various concentrations) in water
ODOR:	Odorless
SPECIFIC GRAVITY (water = 1.0):	1.84 – basis 98% H_2SO_4 @ 15°C (60°F)
SOLUBILITY IN WATER (weight %):	100%
pH:	0.3 (1 N solution @ 25°C (75°F))
BOILING POINT:	~330°C (626°F) – basis 98% H_2SO_4
MELTING POINT:	~ -1.1°C (30°F) - basis 98% H_2SO_4
VAPOR PRESSURE:	0.002 mmHg - basis 98% H_2SO_4 @ 40°C (102°F)
VAPOR DENSITY (air = 1.0):	3.4
EVAPORATION RATE:	Not applicable COMPARED TO: Not applicable
% VOLATILES:	Not applicable
FLASH POINT:	Not applicable

(Flash point method and additional flammability data are found in Section 5.)

The above physical properties will vary based on concentration and temperature. Please contact the technical department for more information.

10. STABILITY AND REACTIVITY

NORMALLY STABLE (CONDITIONS TO AVOID):
Normally stable. Avoid temperatures greater than 300°C: yields sulfur trioxide gas, which is toxic, corrosive, and an oxidizer.

INCOMPATIBILITIES:
Nitro compounds, carbides, dienes, alcohols (when heated): causes explosions.
Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions.
Allyl compounds and aldehydes: undergoes polymerization, possibly violent.
Alkalies, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, aqueous acids: causes strong exothermic reactions.
Carbonates, cyanides, sulfides, sulfites, metals such as copper: yields toxic gases.

HAZARDOUS DECOMPOSITION PRODUCTS:
Sulfur trioxide gas.

HAZARDOUS POLYMERIZATION:
Will not occur.

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS:
LD_{50} (oral-rat): 2140 mg/kg
LC_{50} (inhl-rat): 510 mg/m^3/2 hr
LC_{50} (inhl-mouse): 320 mg/m^3/2 hr

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS:
IARC and NTP have classified "strong inorganic acid mists containing sulfuric acid" as known human carcinogens. No definitive causal relationship between sulfuric acid mist exposure and respiratory cancer has been shown.

OTHER DATA:
None.

12. ECOLOGICAL INFORMATION

24.5 ppm/24 hr./bluegill/lethal/fresh water
42.5 ppm/48 hr./prawn/LC_{50}/salt water

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? Yes **yes, the RCRA ID number is:** D002

OTHER DISPOSAL CONSIDERATIONS:
The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS/PACKING GROUP:	8, PG II
US DOT ID NUMBER:	UN1830
PROPER SHIPPING NAME:	Sulfuric acid
TDG HAZARD CLASS/PACKING GROUP:	8, PG II
TDG ID NUMBER:	UN1830
PROPER SHIPPING NAME:	Sulphuric acid

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on the TSCA Inventory.

OTHER TSCA ISSUES: None.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
Sulfuric acid	1000	1000

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee.

SECTION 311/312 HAZARD CLASS: Immediate. Reactive

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
Sulfuric acid	None

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section.		

ADDITIONAL REGULATORY INFORMATION:

"Strong inorganic acid mists containing sulfuric acid" has been listed on California Proposition 65 as a cancer-causing agent.

WHMIS CLASSIFICATION (CANADA):

D1A, E
Classified in accordance with WHMIS Controlled Product regulations.

EUROPEAN CLASSIFICATION:

Symbol(s)
- C Corrosive

R-phrase(s)
- R35 Causes severe burns.

S-phrase(s)
- S1/2 Keep locked up and out of reach of children.
- S26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
- S30 Never add water to this product.
- S45 In case of accident or if you feel unwell, seek medical advice immediately.

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:

All the components are listed on the following chemical inventories: Australia (AICS), Canada (DSL), European (EINECS), Japan (ENCS), Korea (KECI), China (IECSC) and Philippines (PICCS).

16. OTHER INFORMATION

CURRENT ISSUE DATE: January 27, 2006
PREVIOUS ISSUE DATE: September 1, 2005

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Changes to section 1, 2, 14, 15, and 16.

OTHER INFORMATION: HMIS: 3-0-2
NFPA: 3-0-2-W (water reactive)

SIGMA-ALDRICH

MATERIAL SAFETY DATA SHEET

Date Printed: 10/12/2005
Date Updated: 05/24/2005
Version 1.9

Section 1 - Product and Company Information

Product Name	ZINC CHLORIDE, REAGENT GRADE, >=98%
Product Number	208086
Brand	SIAL
Company	Sigma-Aldrich
Street Address	3050 Spruce Street
City, State, Zip, Country	SAINT LOUIS MO 63103 US
Technical Phone:	314 771 5765
Emergency Phone:	414 273 3850 Ext. 5996
Fax:	800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
ZINC CHLORIDE	7646-85-7	Yes

Formula: ZnCl2
Synonyms: Butter of zinc * Chlorure de zinc (French) * Zinc butter * Zinc chloride fume (ACGIH:OSHA) * Zinc (chlorure de) (French) * Zinc dichloride * Zinco (cloruro di) (Italian) * Zinkchlorid (German) * Zinkchloride (Dutch)
RTECS Number: ZH1400000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Corrosive.
Harmful if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Target organ(s): Kidneys. Liver.

HMIS RATING

HEALTH: 3*
FLAMMABILITY: 0
REACTIVITY: 1

NFPA RATING

HEALTH: 3
FLAMMABILITY: 0
REACTIVITY: 1

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE

If swallowed, wash out mouth with water provided person is

conscious. Call a physician immediately.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Store in a cool dry place. Handle and store under nitrogen.

SPECIAL REQUIREMENTS
Very hygroscopic.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Safety shower and eye bath. Use only in a chemical fume hood.

PERSONAL PROTECTIVE EQUIPMENT
Respiratory: Government approved respirator.
Hand: Compatible chemical-resistant gloves.
Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
Wash contaminated clothing before reuse. Discard contaminated shoes. Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	MSHA Standard-air	TWA	1 MG/M3 (FUME)
USA	OSHA.	PEL	8H TWA 1 MG/M3, FUME
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH	TWA	1 MG/M3
		STEL	2 MG/M3

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	1 MG/M3
Poland		NDSCh	2 MG/M3
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance: Physical State: Solid
Color: White
Form: Powder Crystalline

Property	Value	At Temperature or Pressure
Molecular Weight	136.28 AMU	
pH	5	20 °C Concentration: 100 g/l
BP/BP Range	732 °C	760 mmHg
MP/MP Range	293 °C	
Freezing Point	N/A	
Vapor Pressure	1 mmHg	428 °C
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	2.907 g/cm3	
Bulk Density	1.4 - 1.8 kg/l	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	

Refractive Index	N/A
Optical Rotation	N/A
Miscellaneous Data	N/A
Solubility	Solubility in Water:soluble

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Stable: Stable.
Conditions to Avoid: Moisture.
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Zinc oxide fumes may also form, Zinc/zinc oxides, Hydrogen chloride gas.

HAZARDOUS POLYMERIZATION
Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Skin Contact: Causes burns.
Skin Absorption: May be harmful if absorbed through the skin.
Eye Contact: Causes burns.
Inhalation: May be harmful if inhaled. Material is extremely destructive to the tissue of the mucous membranes and upper respiratory tract.
Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)
Liver. Kidneys.

SIGNS AND SYMPTOMS OF EXPOSURE
Inhalation may result in spasm, inflammation and edema of the larynxand bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

TOXICITY DATA

Oral
Rat
350 mg/kg
LD50

Intraperitoneal
Rat
58 MG/KG
LD50
Remarks: Vascular:BP elevation not charactertized in autonomic section. Sense Organs and Special Senses (Nose, Eye, Ear, and Taste):Eye:Miosis (pupilliary constriction). Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

Intravenous

Rat
3690 UG/KG
LD50

Oral
Mouse
329 mg/kg
LD50

Intraperitoneal
Mouse
24 MG/KG
LD50

Subcutaneous
Mouse
330 MG/KG
LD50

Intravenous
Mouse
9090 UG/KG
LD50

Oral
Guinea pig
200 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN

Species: Hamster
Route of Application: Parenteral
Dose: 17 MG/KG
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Gastrointestinal:Colon tumors.

Species: Chicken
Route of Application: Parenteral
Dose: 15 MG/KG
Result: Tumorigenic Effects: Testicular tumors.
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

CHRONIC EXPOSURE - TERATOGEN

Species: Mouse
Dose: 12500 UG/KG
Route of Application: Intraperitoneal
Exposure Time: (11D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

CHRONIC EXPOSURE - MUTAGEN

Species: Human
Dose: 2 MMOL/L
Cell Type: fibroblast
Mutation test: DNA damage

Species: Human
Dose: 180 UMOL/L
Cell Type: lymphocyte

Mutation test: Unscheduled DNA synthesis

Species: Human
Dose: 360 UMOL/L
Cell Type: lymphocyte
Mutation test: DNA inhibition

Species: Human
Dose: 2 MG
Cell Type: lymphocyte
Mutation test: Other mutation test systems

Species: Human
Dose: 300 UMOL/L
Cell Type: lymphocyte
Mutation test: Cytogenetic analysis

Species: Rat
Dose: 700 MG/KG
Cell Type: Ascites tumor
Mutation test: Cytogenetic analysis

Species: Mouse
Route: Parenteral
Dose: 16 MG/KG
Mutation test: DNA inhibition

Species: Mouse
Route: Oral
Dose: 18 GM/KG
Exposure Time: 30D
Mutation test: Cytogenetic analysis

Species: Mouse
Dose: 6 MG/KG
Cell Type: S. typhimurium
Mutation test: Host-mediated assay

Species: Hamster
Dose: 180 UMOL/L
Cell Type: Embryo
Mutation test: Morphological transformation.

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Rat
Dose: 155 MG/KG
Route of Application: Oral
Exposure Time: (33D MALE)
Result: Endocrine:Change in gonadotropins. Endocrine:Change in LH. Paternal Effects: Other effects on male.

Species: Rat
Dose: 6 GM/KG
Route of Application: Oral
Exposure Time: (77D MALE/77D PRE-21D POST)
Result: Effects on Newborn: Growth statistics (e.g., reduced weight gain). Effects on Newborn: Behavioral.

Species: Rat
Dose: 30 GM/KG
Route of Application: Intraperitoneal

Exposure Time: (7-8D PREG)
Result: Effects on Embryo or Fetus: Fetal death. Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rat
Dose: 37500 UG/KG
Route of Application: Parenteral
Exposure Time: (10D PREG)
Result: Effects on Newborn: Viability index (e.g., # alive at day 4 per # born alive).

Species: Mouse
Dose: 20500 UG/KG
Route of Application: Intraperitoneal
Exposure Time: (8D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Species: Rabbit
Dose: 29184 UG/KG
Route of Application: Intravaginal
Exposure Time: (1D PRE)
Result: Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Section 12 - Ecological Information

ACUTE ECOTOXICITY TESTS

Test Type: NOEC
Species: Selenastrum capricornutum resp.
Time: 96 h
Value: 0.05 mg/l

Test Type: EC50 Daphnia
Species: Daphnia magna
Time: 48 h
Value: 0.2 mg/l

Test Type: LC50 Fish
Species: Cyprinus carpio
Time: 96 h
Value: 0.4 - 2.2 mg/l

Test Type: LC50 Fish
Species: Lepomis macrochirus (Bluegill)
Time: 96 h
Value: 5.4 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Zinc chloride, anhydrous
UN#: 2331
Class: 8
Packing Group: Packing Group III
Hazard Label: Corrosive
PIH: Not PIH

IATA
Proper Shipping Name: Zinc chloride, anhydrous
IATA UN Number: 2331
Hazard Class: 8
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: C-N
Indication of Danger: Corrosive. Dangerous for the environment.
R: 22-34-50/53
Risk Statements: Harmful if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 26-36/37/39-45-60-61
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Corrosive.
Risk Statements: Harmful if swallowed. Causes burns. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.
US Statements: Target organ(s): Kidneys. Liver.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements - zinc compounds.
TSCA INVENTORY ITEM: Yes

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes

NDSL: No

Section 16 - Other Information

DISCLAIMER

For R&D use only. Not for drug, household or other uses.

WARRANTY

The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.